ISSN 1059-1249

The Magic Lantern Gazette

Research Supplement

Number 2 December 2021

The Magic Lantern Society of
the United States and Canada

www.magiclanternsociety.org

It has taken some time to produce this second issue of the *Magic Lantern Gazette Research Supplement* due to a lack of recent contributions. Consequently, I have written both the feature article and the book review myself. The research for this article started almost a decade ago, when I started a comprehensive search of 19th century newspaper databases for information on the use of magic lanterns in American illustrated science lectures. At first, I envisioned a single article surveying the field, but as I investigated each topic in detail, the amount of information grew exponentially. I believe this article is now the eighth one derived from my research on the use of magic lanterns in science lectures.

In fact, the material in this article originally was intended to be a short sidelight in an article on American illustrated lectures on natural history and biology. What I found was a largely unexplored aspect of popular science lectures in America, the use of large painted transparencies rather than projected images to illustrate science lectures. These transparencies were produced by stretching paper or thin fabric on a frame and coating it with melted wax mixed with turpentine to produce a surface on which images were painted with transparent pigments. When illuminated from behind, a luminous translucent image was produced. Many of these transparencies were large—4 feet, 6 feet, or even 10 feet high, and therefore suitable for presentation to a large audience.

Large painted transparencies were first widely used for public entertainment in the 18th century. Most of the English-language scholarship on the art of painted transparencies has focused on London and other British cities, but this art form soon spread to British colonies in North America and Australia. Recent research by several scholars has clarified the role of painted transparencies in popular culture, most notably work by John Plunkett and Alice Barnaby. Research on the transition from a form of spectacular visual entertainment to the illustration of scientific lectures has focused almost entirely on astronomy, the most popular subject for public science lectures in the early 19th century. The work of Martin Bush and Hsiang-Fu Huang has been essential in our understanding of painted transparencies as a mode of illustration in astronomy lectures.

Despite this recent scholarship, the use of painted transparencies in the United States has scarcely been mentioned, and there has been no research on scientific lectures beyond the field of astronomy. I focused my research on American natural history, but it was necessary to first discuss the role of transparencies as public entertainments in both London and America, and the importance of astronomy in setting the stage for illustrated lectures on other sciences. The era of painted transparencies being used to illustrate public lectures was relatively short, mostly disappearing in the 1840s, probably due in large part to the increasing availability of limelight magic lanterns, which greatly increased the size and brightness of images projected on a screen to a large audience.

This issue also includes a review of a fantastic new biography of Edgar Allan Poe, which may seem like an odd topic for this publication until we see that the dustjacket shows a magic lantern projecting onto Poe's head. In fact, Poe, who lived during the same time period covered in my article, was steeped in the popular culture of his era, as well as the latest developments in American science.

As always, I am eager to receive well documented research articles on any aspect of magic lantern history and culture. The *Research Supplement* is especially suitable for long articles not easily published in other journals.

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Painted Transparencies: From Public Entertainment to Public Education in the United States, 1780-1840

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New York, April 1789

In April 1789, Americans were celebrating the inauguration of the nation's first President, George Washington, several weeks after he assumed the responsibilities of his office. The inauguration took place at Federal Hall in New York, which then served as the nation's capitol (Fig. 1). Washington had traveled to New York from his home in Mount Vernon, greeted by large crowds along the way. As he sailed into New York Harbor, he was saluted by cannon fire from a Spanish warship, the American ship *North Carolina*, and artillery on land. Meanwhile, the citizens of New York celebrated the event with all manner of illuminations and decorations, including many large transparencies:

> The **transparent paintings** [emphasis added] exhibited in various parts of the city, on Thursday evening, were equal at least, to any thing of the kind ever before seen in America.
>
> That displayed before the Fort at the bottom of Broad-way, did great honor to its inventors and executors, for the ingenuity of the design, and goodness of the workmanship; it was finely lighted and advantageously situated: The virtues, FORTITUDE,* JUSTICE,† and WISDOM‡ were judiciously applied; of the first, all America has the fullest evidence; and with respect to the two others, who does not entertain the most pleasant anticipations.
>
> *The President. †The Senate. ‡The Representatives of the United States.
>
> His Excellency Don Gardoqui's residence next caught the eye—and fixed it in pleasing contemplation: The *Tout-en-semble* here, formed a most brilliant front; the figures well fancied, THE GRACES, suggested the best ideas; and the pleasing variety of *emblems*, *flowers*, *shrubbery*, *arches*, &c. and above all the MOVING PICTURES, that figured in the windows, or as it were in the *background*, created by fixing the **transparencies** between the windows, afforded a new—an animated and enchanting spectacle.
>
> The residence of his Excellency, Count Moustier, was illuminated in a stile of novel elegance; the splendid bordering of lamps round the windows, doors, &c. with the fancy pieces in each window; and above all the large designs in front, the allusions of which we cannot at present particularly describe, did great honor to the taste and sentiment of the inventor.
>
> The above two instances of attention to honor this great and important occasion, so highly interesting to our "dear country," evince the friendship, the delicacy and politeness of our illustrious allies.

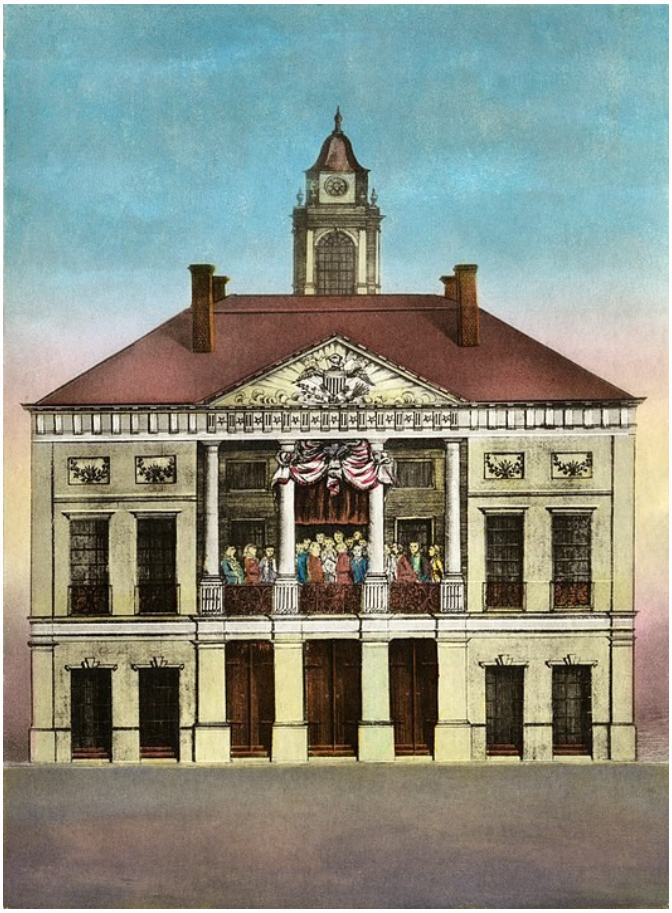


Fig. 1. Hand-colored engraving of Federal Hall in New York in 1789, showing George Washington's inauguration on the balcony. Library of Congress Prints and Photographs Division.

> The portrait of "THE FATHER OF HIS COUNTRY" exhibited in Broad-Street, was extremely well executed, and had a fine effect. There was an excellent **Transparency**, also shewn in the Theatre, and at the corner, near the Fly-Market: In short, emulation and ingenuity were alive; but perhaps were in no instance exhibited to greater advantage than in the display of Fire Works, which, from one novelty to another, continued for two hours, to surprise, by variety, taste, and brilliancy.
>
> The illumination of the Federal State House, was among the most agreeable of the exhibitions of the evening; and the ship Carolina formed a beautiful pyramid of Stars;—The evening was fine—the company innumerable—every one appeared to enjoy the scene, and no accident casts the smallest cloud upon the retrospect.[1]

New Haven, Connecticut, October 1816

In the Fall of 1816, citizens of New Haven, Connecticut were invited to attend a new kind of science lecture, illustrated by Astronomical Transparencies:

> Mr. Whitlow's Botanical **Transparencies** exhibited here last winter suggested the idea of teaching astronomy upon the same principle. Mr. N. S. Read of this town, after consulting several gentlemen eminent in that science, procured a number of paintings for that purpose. On the evening of Wednesday the 9th inst. Mr. Read exhibited his paintings in Broadway before a respectable audience of ladies and gentlemen, with an appropriate introductory lecture. The satisfaction, manifested by every individual present, encouraged Mr. Read to promise a continuance of his exhibitions and lectures every Wednesday evening until he completes the course.[2]

Portland, Maine, November 1833

As winter settled in on Portland, Maine in 1833, Dr. Henry McMurtrie of Philadelphia offered a visual and scientific treat to citizens of that city:

> Dr. McMurtrie being on the eve of delivering a course of his popular Lectures on the above Science [Zoology] in *Union Hall*, begs leave to state that the extensive, splendid and costly apparatus he has procured for the purpose of illustrating his subject, is such as never before been presented to an audience in Europe or America. Many of the illustrations (of which there are several hundred, all **transparencies**) are 6 feet by 4, and were executed in colors on cambric by Signor Monachesi expressly for this course, while the dark closets for their effective exhibition were constructed by professor Millington. The illustrations extend from *Man* to the *Infusoria* (or animalculi).[3]

These three seemingly unrelated events were part of the same cultural phenomenon, the public exhibition of painted transparencies, sometimes of considerable size. These transparencies were designed to be illuminated from behind, outdoors at night or in a darkened room. Suitable illuminants included groups of candles, Argand lamps, or gas lights. Like magic lantern slides, colorful transparencies enhanced public entertainments and celebrations, as well as public lectures on science and other topics. Painted transparencies were familiar to American audiences even in Colonial times, but became particularly popular after 1780. This tradition was imported from England and spread rapidly through the major cities of North America. This article focuses on the use of transparencies to illustrate scientific lectures in the United States, especially in the field of Natural History. First, however, we need to explore the use of transparencies for public entertainment in both London and America, as well as their use in lectures on Astronomy, the first field of science lecturing to adopt this mode of illustration.

The basic process for creating transparencies involved treating a screen made of paper or thin white fabric such as silk, muslin, or linen, with a varnish, often composed of melted wax dissolved in turpentine. Transparent paints were then applied to the treated surface to produce a bright translucent image when illuminated from behind. Large transparencies usually were commercially made, often by painters skilled in producing landscape paintings, signs, or stage scenery. They required some type of free-standing supporting framework, usually made of wood. Often these were temporary structures made for a particular event and then discarded. Smaller transparencies often were mounted in the windows of homes of wealthy individuals and illuminated by house lights. The combination of paper, fabric, wood, turpentine, and wax was very flammable, so not surprisingly, many caught on fire, and most transparencies have not survived to the present day.[4]

Transparent Entertainments in London.

In the pleasure gardens of London, such as the famous Vauxhall Gardens, visitors could stroll along brightly lit walkways, sometime encountering an illuminated transparency 10 or 20 feet high at the end of a path. These transparencies included allegorical illustrations, battle scenes, portraits of the King or other famous men, views of Greek or Roman temples, or Romantic representations of formal gardens. Visitors also were able to view immense transparencies

that could be illuminated from either side to achieve special lighting effects. Often moveable cutout figures and other mechanical effects were used to depict spectacles such as battle scenes, shipwrecks, or volcanic eruptions, accompanied by suitable sound effects.[5] Large backlit transparencies also were featured at many outdoor public events, such as celebrations of the King's birthday, the latest victory over Napoleon, or even the recovery of George III from his most recent bout of madness.[6] Many "Grand Illuminations" combined large transparencies with other lighting effects and fireworks displays.

Painted transparencies were an essential part of many indoor entertainments as well. In the late 18th and early 19th centuries, as theater performances became increasingly focused on visual spectacle, backlit transparencies became a major feature of set designs. This trend led to visual entertainments in which illuminated transparencies became the dominant feature of the program. One of the earliest examples was the Eidophusikon, invented by Philippe de Loutherbourg, a theatrical scene designer, and first presented to a small audience in 1781 . This was a miniature mechanical theater about six feet high and ten feet wide (Fig. 2).

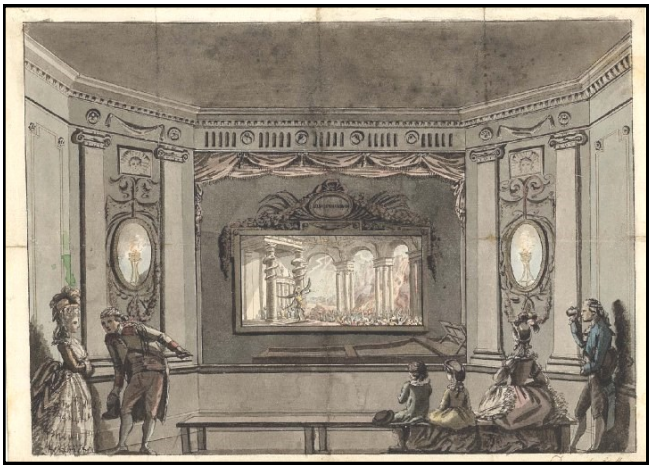


Fig. 2. A view of Philip James de Loutherbourg's Eidophusikon c. 1782. http://www.britishmuseum.org/collectionimages/AN00012/AN00012290_001_l.jpg

The exact mechanism of the Eidophusikon is uncertain. The show probably combined translucent background scenery, lit from behind, with lighting effects that switched between front and backlit illumination and colored filters for special atmospheric changes. Cutout figures, moving ships, and other mechanical motion effects combined with music and sound effects to produce dramatic "motion pictures." Moonrise effects, which were popular in some of the earliest European transparencies, probably were created by enclosing a light in a container with a round hole and slowly lifting it behind the translucent background. In between the performance's dramatic scenes, "Four Transparent Pictures" were exhibited.[7] The effects achieved by de Loutherbourg influenced later optical entertainments such as the Diorama and its many imitators, which featured dramatic visual effects achieved by changing from front lit to backlit scenes.[8]

American Transparencies

British enthusiasm for painted transparencies quickly spread across the Atlantic. American cities such as Philadelphia, New York, Boston, and Baltimore had their own pleasure gardens, complete with Grand Illuminations and displays of transparencies. In Philadelphia's Gray's Gardens (Fig. 3), celebrations of the 4th of July in 1791 included a large transparent painting of the "goddess Independency," along with transparencies of George Washington, Benjamin Franklin, and General Lafayette. A rival garden at Harrowgate featured a "Transparent Optical representation of most of the remarkable cities and principal public buildings in Europe," surely an exaggerated description of the actual exhibition.[9] Harrowgate Gardens even appropriated the name "Vauxhall" to describe an event in July 1792: "Vauxhall at Harrowgate" included "THE GRAND MONUMENT of the Heroes who have fallen in the glorious Cause of Liberty, in beautiful Transparencies, executed by a masterly Artist now in Philadelphia."[10]

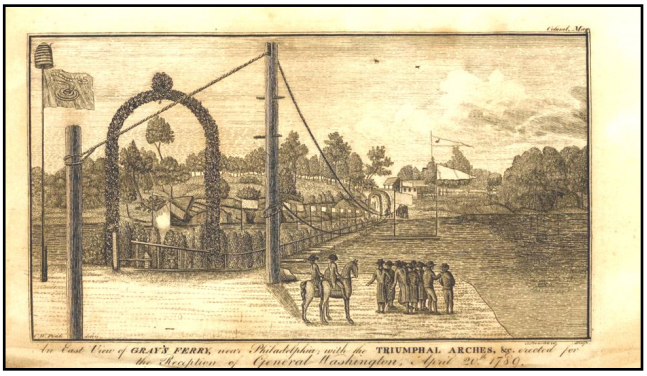

An East View of GRAY'S FERRY, near Philadelphia, with the TRIUMPHAL ARCHES, &c. erected for the Reception of General Washington, April 20th 1789.

Fig. 3. James Trenchard after Charles Willson Peale, "An East View of Gray's FERRY near Philadelphia with the TRIUMPHAL ARCHES, &c., erected for the Reception of General Washington, April 20, 1789." From: *Columbian Magazine* 3, no. 5 (May 1789).

Perhaps the most eminent Philadelphia artist who created large transparencies was Charles Willson Peale (Fig. 4). Peale created large patriotic transparencies celebrating events such as the arrival of George Washington into Philadelphia in November 1781, the ratification of the Constitution in 1788, and the first

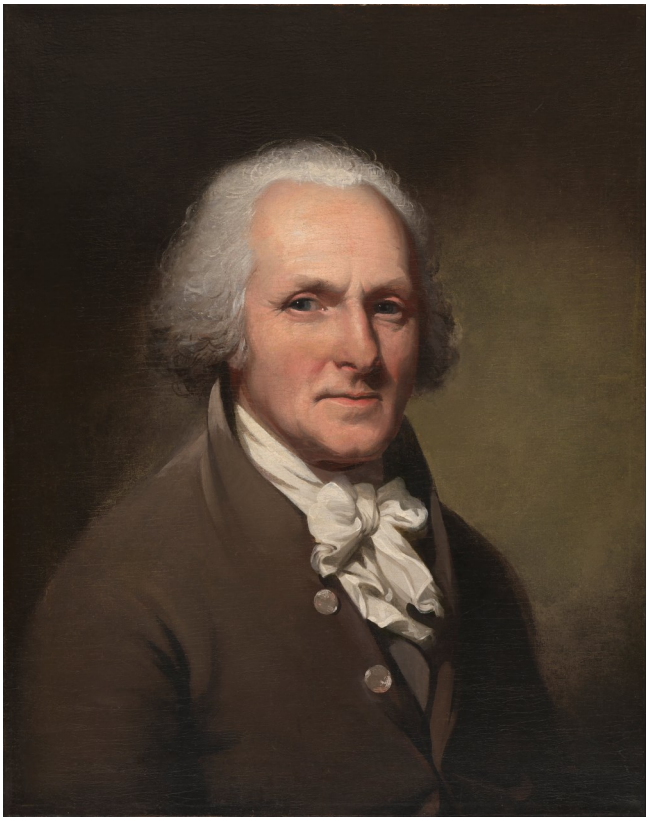


Fig. 4. Charles Willson Peale, self portrait 1791. National Portrait Gallery via Wikimedia.

inauguration of Washington as President in 1789. Peale's most ambitious example of transparent painting was the Triumphal Arch celebrating the ratification of the peace treaty with England in 1784. The framework of this gigantic arch (56½ feet wide, 40 feet tall) was made of wood and decorated with numerous transparencies lighted from inside the arch. The display was to be accompanied by hundreds of rockets soaring into the sky and exploding in a burst of color. Unfortunately, one of the rockets went astray, setting the huge structure on fire and injuring spectators and Peale himself. Nevertheless, four months later, Peale had a new version of the Triumphal Arch on display, without the fireworks.[11]

A few months later, Peale read newspaper accounts of the "moving pictures" produced by Philippe de Loutherbourg's Eidophusikon in London and decided to try his hand at a similar production. Peale's show, entitled *Perspective Views with Changeable Effects; or, Nature Delineated, and in Motion*, included five scenes with special lighting effects: *Night*, *A Street*, *A Grand Piece of Architecture* (a Roman villa with thunderstorms and a rainbow), *Pandemonium* (from Paradise Lost, with chanting of passages from Milton's poem), and finally *Vanderings's Mill* (based on a nearby rustic landscape). He later inserted a dramatic naval battle to celebrate John Paul Jones and his victory over a British warship.[12] Other American exhibitors were influenced by Loutherbourg's Eidophusikon as well. In 1787, a Baltimore theater advertised a show that included "A Superb Display of MOVING TRANSPARENCIES, After the Manner of the celebrated Loutherbourg's Eiduphusicon, with new Scenery and Machinery, the whole to conclude A Grand Emblematical Transparent Illumination."[13]

Displays of large illuminated transparencies remained a key part of American patriotic celebrations, political rallies, and both outdoor and indoor entertainments for at least the first half of the 19th century. A newspaper search for "transparencies" from 1810 to 1850 yields nearly 4000 results. Even allowing for duplicate announcements, this number indicates the pervasive influence of painted transparencies on American life. Patriotic holidays, such as George Washington's birthday and the 4th of July were celebrated in many cities with transparencies and other Grand Illuminations. For example, a Boston newspaper described the celebration of Washington's birthday in 1820:

> In the evening, Concert Hall and the New England Museum (Fig. 5) were brilliantly illuminated. At the former a splendid hall was given. In the centre window of the hall the initial W. was displayed by a handsome transparency. The national ensign was displayed from the Museum throughout the day and a number of well executed transparencies, commemorative of some of the brilliant naval victories of the late war were exhibited in the evening in front.[14]

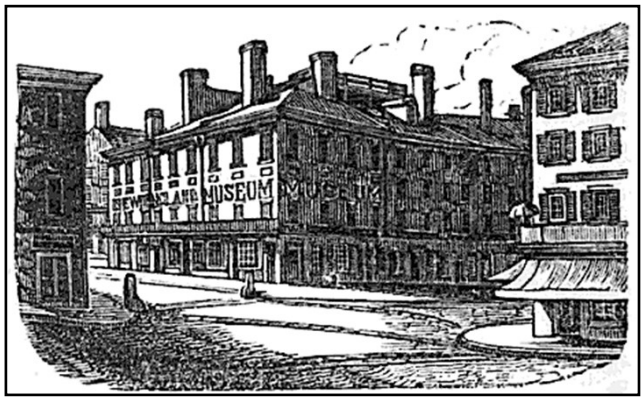


Fig. 5. New England Museum, Court St., Boston, c. 1829. From: *Bowen's Picture of Boston.* 1838.

The 1824 visit of General Lafayette, French hero of the American Revolution, was celebrated all over the country as he traveled from city to city. In Boston, celebrations included a grand display of fireworks and rockets, as well as transparencies:

> Rockets at intervals will be let off during the evening, and the Gardens will be decorated with the Transparencies of Generals Warren, Putnam and Montgomery, allegorically deciphered. Also, the Immortal Washington, and General Lafayette, who will be mounted on a charger, and several other NATIONAL TRANSPARENCIES, will be exhibited.[15]

When Lafayette reached Philadelphia in October 1824 (Fig. 6), the city put on a magnificent show, with a parade of dignitaries and veterans of the Revolution, followed by an evening celebration so impressive that it was reported in a newspaper in far away Painesville, Ohio:

> In the evening, the city was splendidly illuminated, much more so than was anticipated—the Museum presented in front, elegant transparencies of Green, Jefferson, Hancock, Washington, La Fayette, Franklin, Rocheambeau [sic], and Thompson. In front of the Theatre, Peace, Independence, Charity, Liberty, and Justice, were beautifully personified. The Free Masons' Lodge, Academy of Arts, and all the public buildings presented a brilliant spectacle. In private houses there was a great desire to excel, and the transparencies were numerous, rich, and tasteful. On the corner of Dock and Walnut Streets were thirteen brilliant stars hung in a transverse position. The printing offices presented elegant transparencies, of which I have not time to enter into detail—they were highly creditable, to the proprietors.[16]

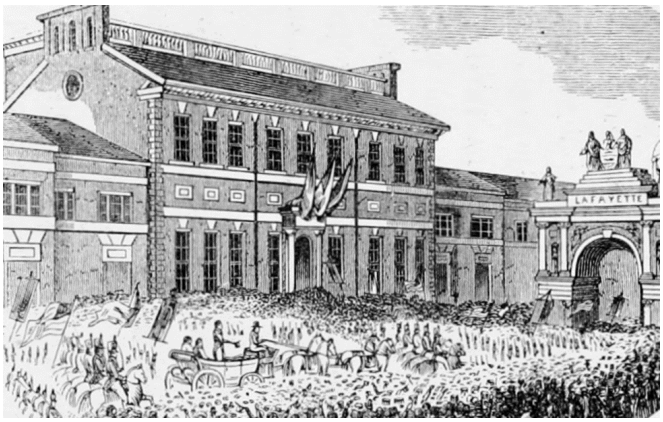


Fig. 6. Welcoming parade for Gen. Lafayette in Philadelphia (1824). The tall windows of buildings of this period were ideal for displaying transparences illuminated by lights inside.

Meanwhile, sign painters and other artists took advantage of the demand for transparencies, especially for holidays, by advertising their skills. In June 1820, Thomas Carroll of Charleston, South Carolina, informed "his friends and the public, that he Paints Transparencies at short notice, for the Fourth of July, at No. 138 Queen-street."[17] In 1824, Samuel J. Bower of Providence, Rhode Island, "Military Standard & Sign Painter," begged leave "to inform the public generally, that he still continues the Painting of Military Standards, Masonic Banners and Aprons, in the best manner and at low prices. Also, SIGNS of all descriptions, Ornamental and Plain; Transparencies on silk or linen; Portrait, Looking Glass and Picture Frames, gilt and painted in oil gilding."[18]

Transparent Science in London

The first scientific lectures to be illustrated by transparencies were on astronomy, the most popular subject for public lectures in the early 19th century. For much of the 18th century, lecturers had used mechanical models of the solar system, known as orreries, to illustrate the basic principles of astronomy. Some orreries were small tabletop models, suitable for display to relatively small audiences. When astronomy lecturers began to move their presentations into larger venues such as theaters and lecture halls, orreries expanded to a size that filled much of the stage. These large machines were cumbersome to transport and assemble, often requiring more than a day to set up and sometimes causing lectures to be delayed.[19]

The problem of presenting illustrations of the heavens at a size suitable for large audiences was addressed by Adam Walker's development of the Eidouranion, or Transparent Orrery, in the 1770s and subsequently displayed in London for fifty years by Adam Walker and his two sons, William and Deane Franklin Walker (Fig. 7). Walker's Eidouranion attracted many imitators and competitors, all of which appear to be based on large backlit transparent paintings, perhaps on a long sheet of fabric mounted on rollers, supplemented by various mechanical motion effects. These devices set the standard for theatrical astronomy lectures, and lectures on other subjects, in England, Australia, and the United States through the 1830's.[20]

Displays of large transparencies to illustrate scientific lectures did not always require an elaborate mechanical apparatus. In July 1825, George Birkbeck (1776-1841) gave a lecture on mechanics to inaugurate the new lecture hall of the London Mechanics' Institution. Among the equipment available in the room was "a large frame, six feet square, for the exhibition of transparent diagrams." The frame was

Fig. 7. Exhibition of Walker's Eidoranion at the Royal Opera House in London. *Wikimedia*.

placed behind the lecture table, "so contrived that it might be raised or lowered, or turned on a spindle to the right and left, so as to afford a complete view of the diagrams to spectators in every part of the room." Among the transparencies displayed was a view of Stonehenge, used by Birkbeck when he discussed the mechanics of hoisting large stones onto the ancient monument without modern tools or machinery (Fig. 8).[21]

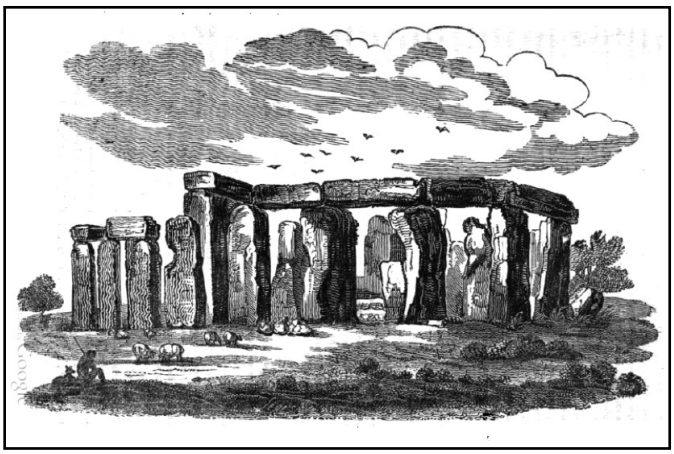


Fig. 8. Woodcut print illustrating a transparency of Stonehenge shown by George Birkbeck in a lecture at the London Mechanics' Institution in 1825.

At another popular lecture venue, the London Institution, the lecture hall, opened in 1819, had even more substantial arrangements for exhibiting transparencies. The lecture hall could accommodate almost 700 spectators. It was "lighted and ventilated by a large circular lantern in the roof, which can be darkened in the day-time for the exhibition of any illustrations requiring the exclusion of light, by letting down a false ceiling below the windows." Behind the lecturer's table was a "fireplace, which can be also accommodated with a portable furnace," and "above is an opening between two columns for receiving transparencies, or a screen for the exhibition of the Phantasmagoria." Behind the opening, which positioned the transparencies or a screen above the head of the lecturer, was a small room, "intended for the Exhibition of Illustrative Transparencies" (Fig. 9). This small room essentially functioned as a rear-screen projection room where assistants could lift transparencies or a projection screen into place and provide suitable illumination by gas lamps or project images from a magic lantern onto a translucent screen.[22]

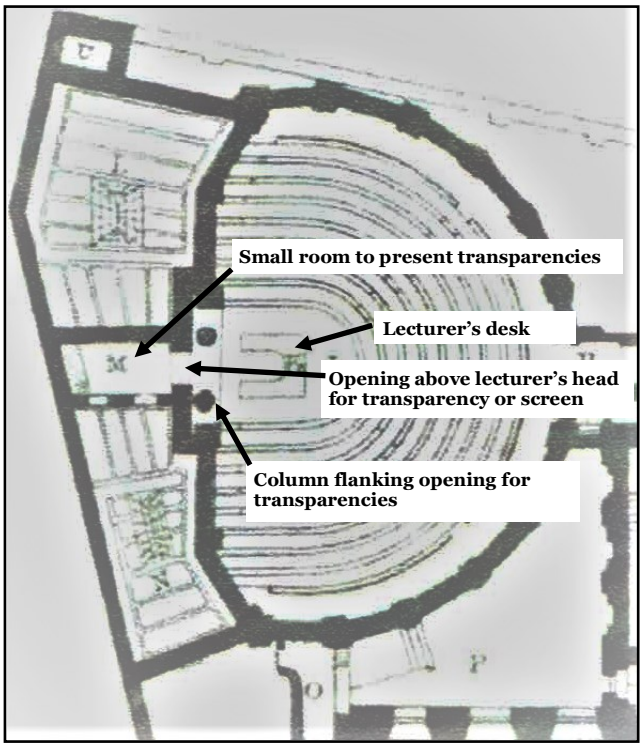

Small room to present transparencies
Lecturer's desk
Opening above lecturer's head for transparency or screen
Column flanking opening for transparencies

Fig. 9. Plan of the lecture hall of the London Institution. From: *A Catalogue of the Library of the London Institution* (1835).

Lecturers at the London Institution used these arrangements to illustrate lectures on a wide range of topics with transparencies. Many of these were on astronomy or other physical sciences, but this institution was unusual in having a fair number of lectures on natural history and biology. One of their star lecturers who made frequent use of large transparencies was John Wallis (1788-1852). In 1827, 1828, and 1832, Wallis "delivered Astronomical discourses, which comprised a general view of the whole science, elucidated by transparent and moving paintings, forming probably one of the best pictorial and mechanical apparatus exhibited by any popular lecturer on the celestial economy." Wallis had previously given a similar set of lectures at the London Mechanics' Institute, with many large transparencies. Several other lecturers, including George Birkbeck, John Millington, Jonathan Pereira, and Edward Wedlake Brayley, regularly moved among institutions, often repeating their lectures for different audiences. Millington lectured on astronomy in 1822; Pereira on the Philosophy of the External Senses in 1831 (assisted by preparations, models, transparent paintings, and experiments); and Brayley on Igneous Meteors and Meteorites in 1828, "illustrated by numerous transparent paintings of the most remarkable meteors."[23]

Astronomy Transparencies in America

A number of mostly obscure American lecturers used transparencies to illustrate lectures on astronomy through the 1830s. In 1816, a Mr. N. S. Read of New Haven, Connecticut, inspired by the botanical transparencies being exhibited by Charles Whitlaw, offered a course of lectures on astronomy and acquired transparent paintings for that purpose. In 1820, a Mr. Dewey proposed to give a series of astronomy lectures in Boston, illustrated "by means of simple transparencies." In 1821, John Griscom, professor of chemistry and natural philosophy at New York High School, offered astronomy lectures illustrated with "various instruments and transparencies." In 1830, the Hartford Museum in Connecticut advertised an Optical Exhibition for November 15, which included an "Astronometer" [perhaps a type of Eidouranion], to be used to produce "large and beautiful Transparencies of Celestial Bodies, Cities, Buildings, Shipping and National Costumes." The announcement included a notice that "previous to the Astronomical Lecture, the Electrical Machine will be in operation, after which the Magic Lanthorn." This suggests that the Astronometer and the Magic Lanthorn were two different instruments. The distinction is less clear in an announcement of a lecture on astronomy by Rev. Mr. Coffin at the William Street Church in Baltimore in 1843, which was to be "illustrated by transparencies and a magic lantern."[24]

Not everyone was pleased with the turn toward elaborate machinery and large transparencies in astronomy lectures. In 1824, one writer launched a diatribe against this trend in a letter to the editor of the *Charleston Courier*:

> I attended, on Thursday night last, the Introductory Lecture of a gentleman at Concert Hall, upon my favorite subject [astronomy]. . . .
> I was instructed and delighted—the simplicity of his apparatus forcibly carried a conviction of its great usefulness, and for the first time in my life was I convinced that much, very much of the mystery and difficulty attending the sublime study of Astronomy had been *the work of man*. In all former lectures I had been accustomed to see paraded before the audience, complex planitariums, intricate oreries, and transparencies, sometimes of very great size, to illustrate the principles of the study. . . .
>
> The Lecturer, in his clear and expressive language, completely satisfied me, that it was feasible to instruct better without it than with it; the apparatus rather serves to darken the mind, than to enlighten and improve it. . . . [Such complexity] is better calculated to gull the superficial of their money, than to improve their minds in the science of Astronomy. . . .
>
> We, lately in Boston, were satisfied that a lecturer on Astronomy understood all the description of his elegant machinery; but we were really among the number who thought, that when he left his transparencies, he had lost his guide in the intricacies of the science—to understand his apparatus, "hic labor, hoc opus est." By these gaudy shows, the mind is led astray, and the attention wanders from what ought to be the real object of research.[25]

Thornton's London Botanical Transparencies

The first attempt to use painted transparencies to illustrate lectures on natural history appears to have been in the field of Botany. In April 1812, London newspapers advertised a series of Botanical Lectures, to be given by Dr. Robert John Thornton (1768-1837), a member of the Royal London College of Physicians and a Public Lecturer on Medical Botany (Fig 10). Thornton's lectures were to be illustrated by the "novel Introduction of Transparencies." To ensure that the most sophisticated members of society would attend, he advised "the Nobility and Gentry to apply for Tickets of admission to the Lectures previous to the times announced."[26] Thornton reappeared the following Spring, offering a series of six botanical lectures at the National Scientific Institute for the Promotion of Useful Knowledge and Experimental Enquiry. Again, the lectures were "illustrated in a novel way, by splendid Transparencies, brilliantly illuminated by Gas Lights."[27]

Fig. 10. Dr. Robert John Thornton, who introduced large painted transparences into his botanical lectures in London in 1812.

The transparencies mentioned in these announcements were derived from color plates (Fig. 11) published in a massive folio volume, *The Temple of Flora* (1807). Despite exhibitions of his prints designed to promote the book, it proved to be too expensive for ordinary readers. In 1812, Thornton published a smaller quarto version, which also failed to attract many buyers. Finally, he had at least some of the plates converted into copied as large transparencies, about four feet square, by painting images on specially treated muslin. The individual transparent paintings were sewn together to form a continuous sheet of fabric about 120 yards long, which was mounted on rollers and scrolled before the audience while illuminated from behind by gas lights.[28]

Modern audiences would not recognize the content of Thornton's lectures as representing the "science" of botany. Instead, flowers were described in terms of human traits, and the illustrations became allegorical representations of the "four continents" generally recognized at the time: Europe, America, Asia, and Africa. Flowers originating in Europe were considered superi-

Fig. 11. Hand-colored print of the American cowslip from Thornton's *Temple of Flora*. These prints were copied to create the transparencies used in his botanical lectures. Internet Archive.

ior to those from distant colonies. Thornton was greatly influenced by the work of Erasmus Darwin, whose long didactic poems, *The Botanic Garden* (1789 and 1791) and *The Temple of Nature* (1803), included long, digressive footnotes on all manner of topics. Thornton's book included many passages from Darwin's poetry, as well as specially commissioned poems and prose appropriate for each flower. Thornton described his *Temple of Flora* as a "Universal Empire of Love," echoing Darwin's *Loves of the Plants*, the second part of *The Botanic Garden*. Both Erasmus Darwin and Thornton relied heavily on literary sources, sometimes going back to the ancient Greeks.[29]

Often anecdotes and travelers' tales substituted for first-hand observations of the natural history of the plants being illustrated. One newspaper account of Thornton's lecture reported that:

> The transparent representations of the several plants introduced to the audience, were much admired, and the illustrations supplied by the Lecturer, were in some instances highly interesting. In describing the *Water Lilies of the Nile* [Fig. 12], he took occasion to explain the

Fig. 12. Hand-colored print of the sacred Egyptian bean, a type of water-lily, from Thornton's *Temple of Flora*. Internet Archive.

the advice given by Pythagoras to his Disciples "not to eat beans." The celebrated Dr. Priestley had supposed this injunction to have been given, because beans made those who fed on them fat. . . . This he (Dr. Thornton) observed was ridiculous, and went on to show that the beans alluded to by Pythagoras were the seed vessels of these water lilies. . . . The great people in his time were accustomed to eat these, and doing this, at one meal to destroy seven or eight hundred seeds of this plant, the root of which (bearing some resemblance to the potatoe), furnished bread to the great body of the people. It was to repress this shameful luxury, that had caused the injunction of Pythagoras. These flowers, he further observed, had been and still were held sacred. It was stated by Sir W. Jones, that one being brought in, when he was in Asia, all the natives present immediately prostrated themselves before it. He was of opinion, its prickly stem might have been the cause of its being held sacred. Growing as it did in the water, its thorns were likely to wound the eyes of the crocodiles which invested those parts. Armed with one of these, a man might swim in the Nile or the Ganges with safety, as the sight of these flowers frightened those creatures, who, in their absence, would not be afraid to seize a man. This circumstance might easily make these appear sacred in the eyes of an ignorant and credulous people.[30]

Robert Thornton had a direct connection to theatrical astronomy lecturers and their use of transparencies through his son, Bonnell Thornton, a rather obscure lecturer on astronomy. In January 1815, father and son appeared together at the great ballroom of the City of London Tavern (Fig. 13). After Robert Thornton's exhibition of botanical transparencies, there was a lecture on astronomy "by Dr. Thornton's son, Bonnell Thornton, a name of distinguished celebrity. . . delivered in a style of very superior excellence, and received throughout the most flattering marks of approbation."[31]

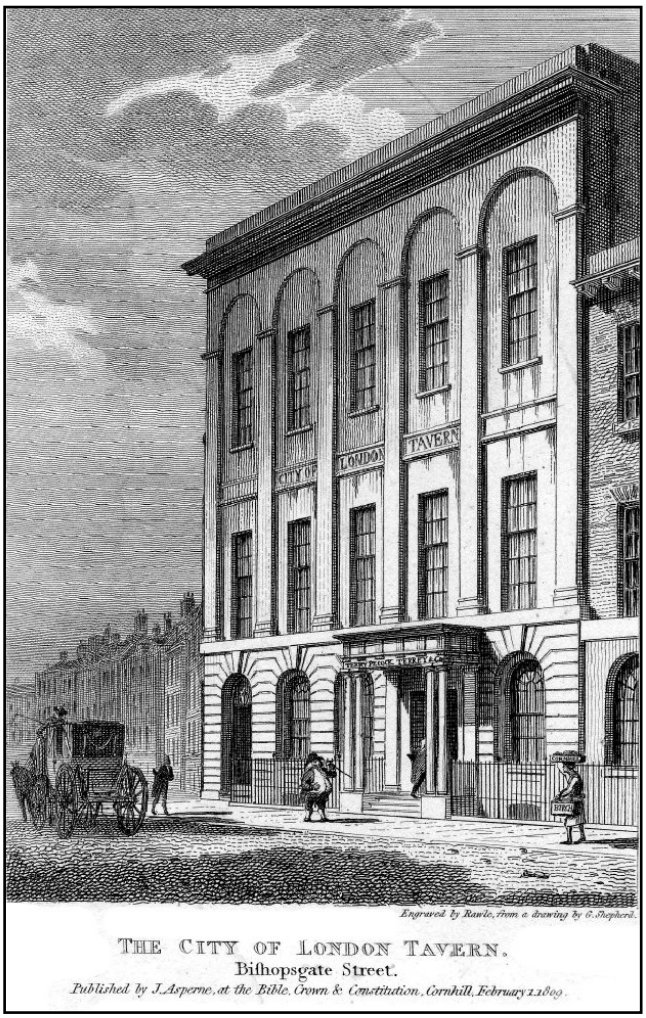


Fig. 13. City of London Tavern 1809. Wikipedia.

In January 1819, Bonnell Thornton appeared at the Large Athenaeum Concert Rooms in Covent Garden with a lecture on astronomy, "illustrated with the most beautiful Transparent Views of the Heavenly Bodies."[32] Bonnell Thornton appeared again at Shade's elegant Concert Room in Soho-Square in March 1819 with a lecture on the "Sublime Science of Astronomy. . . illustrated by a most beautiful Uraniscope."[33] A month later, father and son again shared the stage at the City of London Tavern. By this point, Robert Thornton had given up his lectures with botanical transparencies and turned to medical topics. His lecture focused on "The Human Frame, and the different Gases," including a demonstration of the Laughing Gas. "After that, "Mr. B. Thornton will explain his URANOSCOPE, and LECTURE ON ASTRONOMY."[34] Several years later, "A Grand EXHIBITION of TRANSPARENT PAINTINGS, CHEMICAL EXPERIMENTS, and the HELIOIDON LIGHT, with a Popular Lecture on the Gases used in Medicine, by Dr. Thornton" was announced at the Marlborough Rooms in Great Marlborough Street.[35]

Thornton's "novel Introduction of Transparencies" for his botanical lectures seems to have sparked relatively little interest among British lecturers in illustrating natural history lectures with transparent paintings. Nevertheless, in some cases, the use of such transparencies migrated into science classrooms, where they were in use late into the 19th century. The sole known surviving natural history transparencies are the Hudson Transparencies, owned by the University of Essex. These give us a good idea of the appearance and construction of transparencies used to illustrate lectures earlier in the 19th century. Created by Charles Thomas Hudson (1828–1903) a Bristol schoolteacher and President and Honorary Fellow of the Royal Microscopical Society, each transparency is painted on a paper screen with a wooden frame, 96 cm (38 inches) high and 76 cm (30 inches) wide. Pinpricks in the paper produced highlights when lit from behind. Masking with brown paper produced an effect of a luminous plant or animal suspended against a black background, similar to the effect of modern photographs of deep sea creatures (Fig. 14).[36]

Fig. 14. Three examples of the Hudson transparencies, showing various marine and freshwater invertebrates. The Hudson Transparencies – The Devonshire Association (devonassoc.org.uk)

Natural History Transparencies in America

In 1815, when Robert Thornton abandoned his hopes of making a profit from lecturing with his botanical transparencies, he apparently sold them to Charles Whitlaw (1771-1850) [often spelled Whitlow in newspapers], a largely self-educated Scottish botanist who had been living in North America for about 20 years, but was in London at the time. Whitlaw promptly traveled back across the Atlantic and took up lecturing with Thornton's transparencies. He appeared in Montreal in late November 1815 and began a series of lectures in New York in January 1816.[37] A newspaper announcement of his lectures suggests they combined some practical aspects of botany and horticulture with a seemingly unrelated presentation of Thornton's transparencies accompanied by suitable poetry:

> Mr. Whitlaw will in the course of his Lectures, attempt to explain the nature and cause of the dry rot in timber; the cause of the destruction of fruit trees, with the means of prevention. He will likewise give some remarks on the alteration of the climate of the United States; and lastly, the means of preserving potatoes, and other roots for a considerable length of time.
>
> Among the Paintings is that of the TEMPLE OF FLORA, or Garden of Nature, with the poetic compositions made on the different subjects, by the celebrated Dr. Thornton, of London. The Transparencies are admitted by the best judges of Europe to be the most splendid ever yet presented on any science whatever.[38]

Subsequent announcements for lectures in New York, Albany, New Haven, Baltimore, Washington, Philadelphia, and Boston throughout 1816 and 1817 dropped the initial mention of dry rot and potato preservation and focused on the beauty of the transparencies:

> Mr. Whitlaw designs giving a lecture on the Temple of Flora and Philosophy of Botany. The transparencies are one hundred and twenty yards long and four feet broad, and are admitted by the best judges in Europe to be the most splendid ever yet presented on any science.[39]

Whitlaw traveled a lot, including several times back and forth to London, so it is hard to know exactly how often he gave his lectures. In 1819 and 1820, he was in London, where he gave a series of botanical lectures with "transparent paintings." He was back in the United States for a short time in 1825 and may have delivered some lectures.[40] Whitlaw turned up

in New York in 1834, where he appeared at Clinton Hall in New York with lectures on Botany, "illustrated by beautiful transparencies representing the various classes and orders of the Linnean system."[41]

Newspaper commentaries often cited the large size of Whitlaw's transparencies as an important innovation for lecturing to large audiences. For example, a New York writer, using the name FLORIST, said this:

> Botany as yet in its infancy, is so little known in the United States, that but a few are acquainted with more than the meaning of the term, which may in great measure be attributed to the difficulty attending the attainment of so elegant accomplishment. It has heretofore been the custom to give instruction from living examples, or from plates, the size of the plant and by which only a few could be instructed at a time. . . . Many parts of the plant are so small that they do not attract the notice of a superficial observer—such have been the causes that now retard many from obtaining as acquaintance with Botany.
>
> But we are indebted to Dr. Thornton, for introducing a new work of Instruction—which promises to be as useful as it is novel—transparent paintings are made use of to depict the different parts of the plant, and these to be so magnified that they may be demonstrated to one thousand persons at one and the same time. The execution of the paintings far exceeds any thing of a similar nature ever exhibited in this country, and the exactness of the various representations serves to impress it more firmly on the memory than any mode of instruction heretofore used.[42]

Another writer stated that "Mr. Whitlow could lecture to 300 persons with the same facility as he can to three, by the help of his Botanical Transparencies."[43] When Whitlaw visited Philadelphia, local clergyman William Staughton wrote, "I have had the pleasure of seeing the elegant transparencies lately exhibited by Mr. Whitlow, in the northern parts of our union, and now introduced into our city . . . . Like the models of the anatomist, they popularly present to the view, objects which unassisted vision can scarcely discover. The beauties of the vegetable creation, are accurately displayed, without the trouble of microscopic inspection."[44]

Not every commentator had a completely positive reaction to Whitlaw's lectures. A writer calling himself PHILOPHUSEOS stated in a New Haven newspaper that some Yale professors had been criticized for recommending his lectures to the citizens of the city: "Mr. Whitlow's method is very unscientific, and resembles rather the mummery of a show-man, than the style of a lecturer. . . . I will briefly state my opinion of Mr. W's method of teaching Botany. I do not believe it will ever make a practical botanist. Neither do I conceive it to be calculated to convey much physiological knowledge." He then grudgingly admitted that Whitlaw's transparencies might provide some service in exciting in pupils "a taste for the study of Botany," which could then be amplified by a more knowledgeable teacher.[45] In a letter signed by six prominent men of Philadelphia, the writers admitted that Whitlaw's speaking style was "not decorated with the choice embellishments of rhetorical arrangement; yet to the student of Botany, they possess what is of incomparably more importance, viz. perspicuity of style, simplicity of thought, richness of illustration, and unaffected ease of interesting narrative."[46]

From 1817 through the 1830s, several American lecturers used painted transparencies to illustrate lectures on natural history. Perhaps some of them were directly influenced by Whitlaw's lectures, as Mr. Read had been when designing his lectures on astronomy (see note 24). Others may have hit upon the idea independently. In October and November, 1817, Samuel Akerly (Fig. 15) delivered a series of lectures on zoology at Scudder's American Museum in New York. This was at the same time that Whitlaw was touring cities in eastern North America with his botanical transparencies.

Fig. 15. Samuel Akerly (1785-1845). Samuel Akerly | Shellers From the Past and Present (conchology.be)

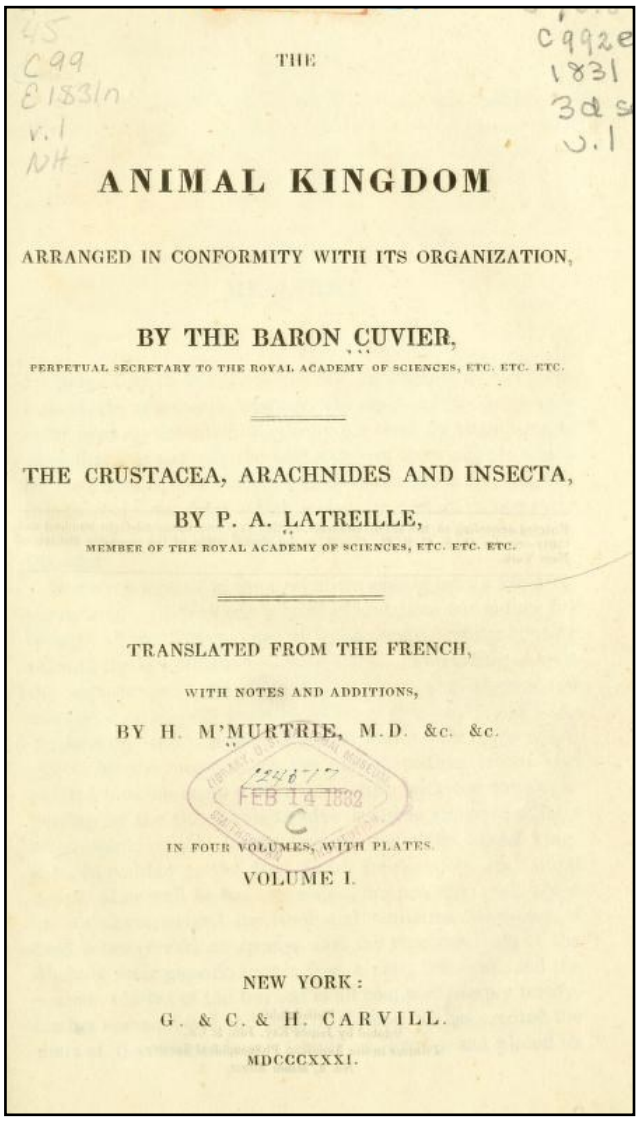
Akerly combined demonstrations of museum specimens with illustrations:

> The illustrations of the subject of each Lecture will be taken from the specimens in the Museum, and properly exhibited for the occasion; and where these are wanting, transparent paintings will be lighted up for the purpose, that will be seen by all present. Those who are desirous of detailed information are requested to call on the subscriber, and see the manner in which he intends illustrating the subjects by these transparencies, a method which is new in this department of natural science, and he trusts will be found highly agreeable and entertaining. The subject matter of these lectures will be so arranged as to not offend the delicacy of the female ear.[47]

I have found only one botanical lecturer who followed Whitlaw's example in using transparencies to illustrate his lectures. This was Dr. William Zollickoffer (1793-1853), lecturer on medical botany at the University of Maryland. In 1828, a Baltimore newspaper announced Doctor Zollickoffer's second Botanical Lecture to be given in Chemical Hall at Washington Medical College (located in Baltimore), to which "Ladies and gentlemen, citizens and strangers are particularly invited to attend." Dr. Zollickoffer was to "lecture upon a new plan, by introducing Transparencies."[48] It is worth noting that Thornton, Whitlaw, Akerly, and Zollickoffer all claimed that use of transparent paintings was a "new" way of illustrating lectures in natural history.

One of the most prominent lecturers on natural history who used transparencies to illustrate his lectures was Dr. Henry McMurtrie (1793-1865). He was best known as the first translator of Baron Cuvier's *Animal Kingdom* from French into English, a book that very likely served as the main source of information for his lectures (Fig. 16). In March 1833, McMurtrie began a lecture tour of major American cites, starting in Philadelphia. The Philadelphia *National Gazette* announced his debut with special emphasis on his illustrations:

> We understand that a rich repast is about to be placed within the reach of lovers of *Nature* and Natural History. A scientific gentleman of Philadelphia, every way qualified for the task, has long been engaged in preparing a course of popular lectures on Zoology, or that science which treats of the organization, habits and arrangement of the animal creation. One of our ablest mechanicians, Mr. Millington, has been employed to construct the apparatus required for the effective exhibition of the almost interminable series of transparencies prepared to illustrate the course; and when we state that among these, many are six feet by four, and painted on cambric by Signor Monachesi, some idea may be formed of their beauty, and of the exertion made by the lecturer to render his course worthy of his subject.
>
> A friend informs us that although the illustrations (all transparent) extend from man to the infusoria, including the general and comparative anatomy, and finely colored figures of the most remarkable monkeys, quadrupeds, birds, reptiles [Fig. 17], fishes, insects and zoophytes—the lecturer has had a special eye to the presence of the *ladies*, with whose company he hopes to be honored. This is as it should be; and we presume that he will have a numerous and fashionable class.[49]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THE

ANIMAL KINGDOM

ARRANGED IN CONFORMITY WITH ITS ORGANIZATION,

BY THE BARON CUVIER,

PERPETUAL SECRETARY TO THE ROYAL ACADEMY OF SCIENCES, ETC. ETC. ETC.

THE CRUSTACEA, ARACHNIDES AND INSECTA,

BY P. A. LATREILLE,

MEMBER OF THE ROYAL ACADEMY OF SCIENCES, ETC. ETC. ETC.

TRANSLATED FROM THE FRENCH,

WITH NOTES AND ADDITIONS,

BY H. M'MURTRIE, M.D. &c. &c.

FEB 14 1832

IN FOUR VOLUMES, WITH PLATES.

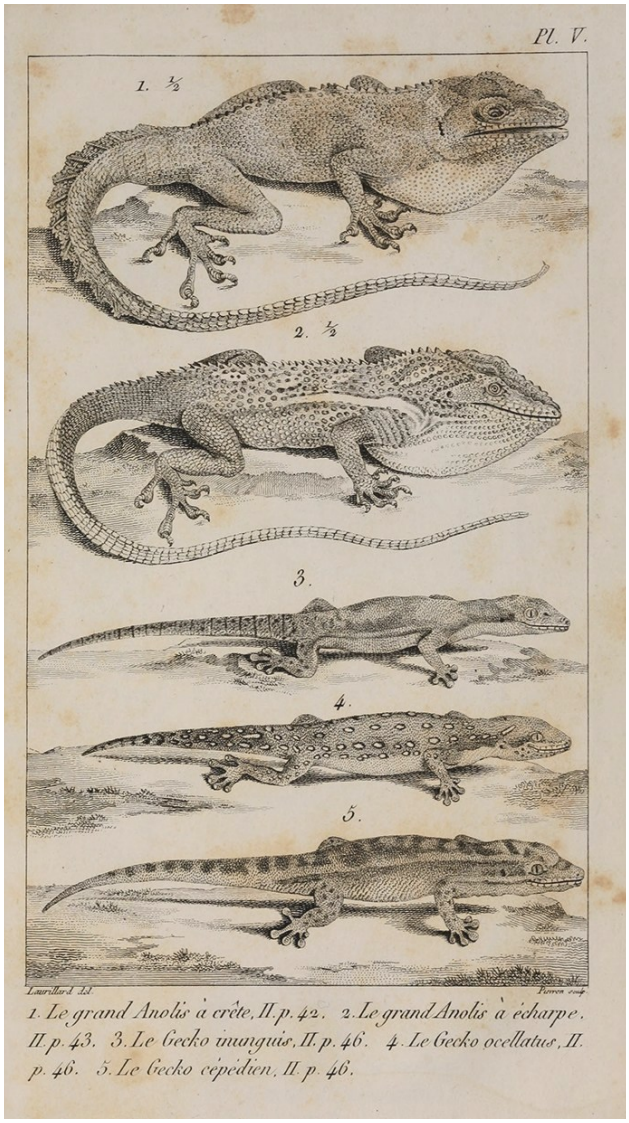
VOLUME I.

NEW YORK:

G. & C. & H. CARVILL.

MDCCCXXXI.

Fig. 16. Title page of *The Animal Kingdom* by the Baron Cuvier, translated by Henry McMurtrie (1831).


Pl. V.
1. ½
2. ½
3.
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5.
Laurillard del. Perrot sculp.
1. Le grand Anolis à crête, II. p. 42. 2. Le grand Anolis à écharpe. II. p. 43. 3. Le Gecko inunguis, II. p. 46. 4. Le Gecko ocellatus, II. p. 46. 5. Le Gecko cépédien, II. p. 46.

Fig. 17. Plate from Cuvier's Animal Kingdom (1831) showing various species of lizards.

Apparently, the initial price of admission proved to be too high for the average Philadelphian, so a few weeks later, a reduction in price was announced. The same announcement gives some additional details of the transparencies:

> Our readers have no doubt remarked the reduction in the price of admission to the Zoological lectures of Dr. McMurtrie, as advertised in his Card in this paper. The terms originally adopted, although not too high, were unequal in their operation. The present arrangement obviates all difficulties of the kind.
>
> We learn that the large transparencies exhibited on the night of the Introductory, are but a small proportion of Signor Monachesi's work, which cannot be seen to advantage till the commencement of the Course, when the pictures, six feet by four, will be placed singly and consecutively in the large dark closet built especially to receive them. They include all the *generalities* of the anatomy of the human body—the point of comparison to which the lecture will refer the structure of all other animals. The osseus, muscular, nervous, respiratory, and circulating are all delineated on a large scale for *demonstration*; gigantic views of the *eye*, *ear*, and *larynx*, or organs of the voice, are among the number. A friend, who has seen the whole of the preparations for the Course, declares that they are unequalled both in beauty and number.[50]

McMurtrie brought his zoological lectures to Boston in September 1833. In November, he appeared in Portland, Maine, where he claimed that "the extensive, splendid and costly apparatus he has procured for the purpose of illustrating his subject, is such as never before been presented to an audience in Europe or America." This is not strictly true, since the lectures had already been presented in Philadelphia and Boston. We learn that the entire course "will consist of from 16 to 20 Lectures," to be given at a rate of three per week (Monday, Wednesday, and Friday). The lectures would provide "a clear, intelligible and philosophical idea of the *whole* Animal Creation, not merely through the medium of the *ear*, but also through that of the *eye*." The price of admission for the whole course of lectures was $3.00 for single tickets, ladies and gentlemen together $5.00, families of three or more, $2.00 for each member. The Introductory lecture, which provided an outline of the full course and a sample of the spectacular illustrations, was priced at 25 cents, although in later appearances, the Introductory lecture was free.[51]

In 1834 and 1835, McMurtrie took his zoological lectures to New Bedford, Massachusetts; Portsmouth, New Hampshire; Salem, Massachusetts; and Baltimore, Maryland, before bringing his lectures back to Philadelphia in the spring of 1836. Presumably these appearances involved separate trips from Philadelphia, since several months often separated lectures in different cities. By the time he reached Baltimore, the price of tickets had gone up—$5.00 for single tickets, $8.00 for ladies and gentlemen together. Like many lecturers of this period, McMurtrie was especially eager to attract a female audience: "Every thing that could possibly prevent the attendance of the ladies, with whose company the lecturer hopes to be honored, has been sedulously avoided."[52]

In 1839, McMurtrie was appointed Professor of Anatomy, Physiology, and Natural History at the recently founded Central High School in Philadelphia. He con-

tinued to use transparencies to illustrate his lectures at the school for an unknown period of time (he taught at the school for 22 years). Apparently at least some of the original transparencies were replaced with new ones. An alumnus of the school later recalled that "The transparencies used by the doctor to illustrate his lectures are among the best executed we have ever seen. They were painted for him by his son, William, who is an artist of high reputation."[53]

The announcements for McMurtrie's lectures provide more information on the use of transparencies for illustrations than announcements for any other lecturer. First, we learn that the transparencies were quite large, six feet by four feet, and there were several hundred of them. Even accounting for the relatively light weight of the paintings on thin fabric, presumably each in a wooden frame, this would have been a considerable amount of weight for the lecturer to haul around to different cities. Second, each transparency was inserted individually into the viewing apparatus, in contrast to the roll transparencies used by Thornton and Whitlaw. Presumably this would have been at least a two-man job. This apparatus, called a "large dark closet," presumably was a portable version of the "small room" located behind the lecturer at the London Institution. The designer of this apparatus was John Millington, lecturer at the London Institution and a close associate of George Birkbeck, who described a frame for holding transparencies in his lecture inaugurating the Institute's lecture hall. That transparency holder was slightly larger than the one used by McMurtrie, six feet by six feet. When Millington moved to Philadelphia in 1833, he set up a short-lived scientific shop to supply all manner of scientific apparatus to local scientists, including "Magic Lanterns and Phantasmagorias with slides; and many optical deceptions and recreations," as well as "all requisites for catching and preserving subjects of Natural History."[54] It was in this capacity that Millington was enlisted to construct the "dark closet" for displaying transparencies.

We also learn that McMurtrie employed at least two artists to paint his transparencies. The first was an Italian artist, Nicola Monachesi (1795-1851), newly settled in Philadelphia in 1832. Monachesi was best known for oil-on-plaster frescos painted on the interior walls of public buildings, churches, and private homes, so was accustomed to working on a large spatial scale.[55] The second was his own son, William Birch McMurtrie (1816-1872) (Fig. 18), who is best known for watercolor landscapes of California and the West Coast produced while working as a topographical artist for the Pacific Coast Survey Expedition in the 1850s. Before that, he had exhibited several of his paintings in Philadelphia and became acquainted with some of the city's leading citizens, including one of many largely forgotten Vice Presidents of the United States, George Mifflin Dallas, who served under President James K. Polk from 1845 to 1849.[56]

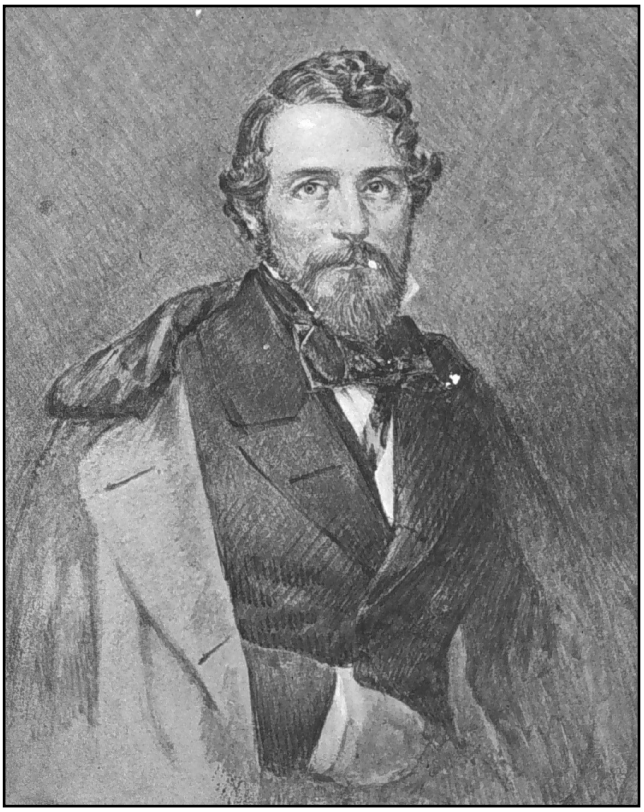


Fig. 18. William Birch McMurtrie, son of Henry McMurtrie, who painted some of the transparencies for his father's zoological lectures. NOAA Photo Library.

In the 1830s, while Henry McMurtrie was bringing zoological transparencies to the major cities in the northeastern United States, Rev. Dr. John Bachman of Charleston, South Carolina (Fig. 19), was introducing transparencies to the South. Bachman was at the center of a group of naturalists in Charleston, the only southern city with significant scientific activity. He also was a close friend and collaborator of John James Audubon. In 1835, he delivered a lecture, "On the Organization, Metamorphosis and Habits of Insects, illustrated by Transparencies," to Charleston's Literary and Philosophical Society. This society had been formed by Bachman to further his goal of bringing knowledge of science to the general public.

In the summer of 1837, the society hosted a course of lectures, mostly on various scientific topics. In addition to Bachman, several other lecturers used transparencies to illustrate their talks: Dr. B. B. Strobel on the anatomy and physiology of the eye, with "a brilliant collection of transparencies;" Dr. Ramsay on animal mechanics, "with a transparency of the circulation of the blood;" James H. Smith on the geological structure of the Earth, and the Natural History of the Antedeluvian world, "illustrated by a diagram

Fig. 19. Rev. John Bachman of Charleston, South Carolina, who used transparencies to illustrate lectures on insects.

and transparencies;" Dr. Baron on the natural history of the Beetle Tribe; and Dr. [Eli] Geddings on a comparative view of the nervous system of man and animal, illustrated by transparencies.[57] Unfortunately, none of the newspaper accounts of these lectures provides any detail about the transparencies. One comment on Bachman's insect lecture, which he repeated in 1836, focused on his spoken delivery, without mentioning his illustrations: "The Lecturer poured forth the resources of his richly stored mind, in an uninterrupted strain of beautiful remark. His description of the habits and instincts of the Entomological world became almost poetry, the effect of his enthusiasm for animated Nature. The audience was held in rapt attention during the whole of the Lecture."[58]

The Twilight of Transparencies

The use of large transparencies to illustrate lectures on natural history and other topics seems to have faded rapidly after about 1840. Of course, some lecturers continued to use materials they already had available. For example, in Charleston, Eli Geddings (Fig. 20)

Fig. 20. Dr. Eli Geddings, who lectured on the nervous system with transparencies.

continued to use transparencies to illustrate his lectures on the nervous system in 1841, as did Benjamin Strobel for his lectures on the eye.[59] In 1844, a Mr. Carroll lectured on "The History of Charleston," the first of which was "thinly attended." "Mr. Carroll has been at much expense of time and labor in preparing these lectures—and the cost of getting up the transparencies, &c. for illustration has not been inconsiderable—let the public bear this in mind, and bestow that patronage which it is ever ready to award to merit and patriotism."[60] Whether this person is the Thomas Carroll who had advertised his skill at painting transparencies in 1820 is not known.

Dionysius Lardner, the most popular science lecturer of the 1840s, may have used large transparencies early in his lecture tour, but it is hard to tell because of the wide range of terms he used to describe his illustrations: dissolving views, transparent paintings, transparent diagrams, dioramas, dioramic views, dioramic pictures, moving dioramas, and panoramas. A description of his lecture on astronomy in New York in 1841 stated that, "Several large and beautiful transparent diagrams, illustrative of the solar and planetary systems, were exhibited by the doctor." In April 1842, Lardner delivered a lecture in a Baltimore church. Part 1 was on the Moon, "to be illustrated by a **Transparent Telescopic Drawing** of the Moon" (emphasis added), occupying a space of above sixty square feet [a rectangle of approximately 7 feet X 9 feet]. Part 2 featured the Aurora Borealis, "illustrated by two Dioramic Representations of RE-

MARKABLE AURORAS. . .” along with Water Spouts “illustrated by TWO DIORAMIC REPRESENTATIONS. . . .” Part 3 was on THE PLANETS, illustrated by **Transparencies, which are made upon a scale to fill the area of the Church.**” Part 4 featured THE MAGIC LANTERN AND PHANTASMAGORIA, with lunar and solar eclipses, phantasmagoric exhibitions, and goblin figures with the motion of the eyes and limbs. The descriptions of how different parts of the lecture were illustrated suggests that the first three parts relied on large painted transparencies, with the magic lantern in Part 4 being an entirely separate demonstration.[61]

By the time Lardner reached Charleston in December 1842, he seems to have been using a combination of large transparencies and a limelight magic lantern: “Dr. Lardner . . . is making extensive and expensive preparations for the delivery of his lectures and the exhibition of his costly and beautiful transparencies. His lectures will be chiefly on the subjects of astronomy and optics; and with the aid of his brilliant Drummond light, magnifying lenses, phantasmagoria and illustrative transparencies, he will render them as attractive to the eye as they will be instructive to the mind.”[62] In this passage, it is hard to tell whether the “phantasmagoria” (magic lantern) and “illustrative transparencies” refer to two different devices.

A later description of the actual lectures shows that at least some “transparencies” were magic lantern slides: “The transparencies were exceedingly attractive, and were magnified by means of lenses of great power and the Drummond light, from miniatures exquisitely painted on glass by a skilled and ingenious London artist.”[63] Another description stated that the “miniatures exquisitely painted on glass” were four inches wide, a reasonable size for a magic lantern slide. Lardner may have used the term “transparency” because it was already familiar to American audiences, whereas there was not yet a standard term to describe magic lantern slides.[64] Lardner appears to have been the first lecturer in America to use a limelight magic lantern, and he also incorporated the oxyhydrogen microscope into his lectures, a device that would carry the tradition of illustrated natural history lectures into the second half of the 19th century.[65] The availability of powerful limelight magic lanterns with high quality lenses, and most of all, the advent of photographic slides, made the rather cumbersome painted transparencies obsolete as a means of illustrating lectures before large audiences.

Notes and References

1. *Gazette of the United States* (New York), April 29, 1789, p. 23. The description of the celebrations and decorations was published the day before Washington took the oath of office on the balcony of Federal House. The fort at the tip of Manhattan was first built by the Dutch in 1673 and changed hands and names several times among the Dutch, English, and Americans. It was torn down in 1790 to make way for the construction of Government House, originally intended to be the President’s residence. Don Diego de Gardoqui (1735-1798) served as Spain’s Minister to the United States. Elénor-François-Élie, marquis de Moustier (1751- 1817) was the French Minister to the United States. The Fly-Market was a marketplace for meat, fish, and produce first established by the Dutch. The name comes from the Dutch name for the marshy valley where it was constructed, Smee’s Vly, not from the presence of flies.

2. “Astronomical Transparencies,” *Columbian Register* (New Haven), October 12, 1816, p. 3.

3. “Lectures on Zoology,” *Eastern Argus* (Portland, Maine), November 8, 1833. The name “cambric” was originally used for a very fine, almost sheer white linen fabric, often used to make screens for transparencies. An alternative material for such screens was muslin, a nearly transparent cotton fabric.

4. Birgit Verwiebe. 1997. *Lichtspiele. Vom Mondscheintransparent zum Diorama* (Füsslin Verlag, Stuttgart, Germany). Anita Callaway. 2000. *Visual Ephemera: Theatrical Art in Nineteenth Century Australia* (University of New South Wales Press, Sydney). John Plunkett. 2005. Optical recreations, transparencies, and the invention of the screen. In: Vanessa Toulmin and Simon Popple, eds. *Visual Delights Two. Exhibition and Reception* (John Libbey, Eastleigh UK), pp. 175-193. Alice Barnaby. 2009. *Light Touches: Cultural Practices of Illumination in London 1770-1840.* Ph.D. Thesis, University of Exeter. Alice Barnaby. 2017. *Light Touches: Cultural Practices of Illumination, 1800-1900* (Routledge, London and New York). Peter Benes. 2016. *For a Short Time Only. Itinerants and the Resurgence of Popular Culture in Early America* (University of Massachusetts Press, Amherst and Boston), pp. 288-290. Benes gives the example of a set of four transparencies celebrating the repeal of the Stamp Act in 1766, assembled into an obelisk and erected on Boston Common by the Sons of Liberty. It was illuminated from inside by 280 candles. Not surprisingly, the structure caught on fire, but was memorialized in an engraving by Paul Revere (p. 289).

5. Richard D. Altick. 1978. *The Shows of London* (Harvard University Press, Cambridge MA), pp. 319-331. Frances Terpak. 2007. Free time, free spirit: popular entertainments in Gainsborough’s era. *Huntington Library Quarterly* 70:209-228.

6. Terpak (p. 216) reproduces “a print taken from a transparent painting . . . in celebration of His Majesty’s complete recovery” (1789).

7. Altick, *Shows of London* (see note 5), pp. 117-127. Erkki Huhtamo. 2013. *Illusions in Motion: Media Archaeology of the Moving Panorama and Related Spectacles* (MIT Press, Cambridge MA), pp. 98-104. Iain McCalman. 2005. Magic, spectacle, and the art of de Loutherbourg’s Eidophusikon, in: Ann Bermingham, ed. *Sensation and Sensibility: Viewing Gainsborough’s Cottage Door* (Yale University Press, New Haven CT), pp. 180-197. Christopher Baugh. 2007. Philippe de Loutherbourg: technolology-driven entertainment and spectacle in the late eighteenth century. *Huntington Library Quarterly* 70:251-268. Shearer West. 2019. Virtual reality *avant la Lettre*: Loutherbourg and the origins of urban spectacle. *Nineteenth Century Theatre and Film* 46:119-135. Ann Bermingham. 2016. Technologies of illusion: de Loutherbourg’s Eidophusikon in 18th century London. *Art History* 39:376-399.

8. Huhtamo (2005) (see note 7), pp. 139-167. Plunkett (2005) (see note 4). Barnaby (2009, 2017) (see note 4).

9. Anne Beamish. 2015. Enjoyment in the night: discovering leisure in Philadelphia's eighteenth-century rural pleasure gardens. *Studies in the History of Gardens & Designed Landscapes* 35:198-212.

10. *Dunlap's American Daily Advertiser* (Philadelphia), July 12, 1792, p. 1.

11. Lillian B. Miller. 1983. Charles Willson Peale: a life of harmony and purpose. In: Edgar P. Richardson, Brooke Hindle, and Lillian B. Miller, *Charles Willson Peale and His World* (Harry Abrams, New York), pp. 181-185. For the Peale family's enduring interest in all sorts of optical spectacles, see Wendy Bellion. 2011. *Citizen Spectator. Art, Illusion, & Visual Perception in Early National America* (University of North Carolina Press, Chapel Hill).

12. Miller (1983), pp. 185-187. Peale exhibited his "motion pictures" until about 1790 and then sold the transparent paintings to a traveling showman.

13. *Maryland Journal* (Baltimore), September 28, 1787, p. 3. A much later production by William Dunlap, *A Trip to Niagara, or Travelers in America*, a type of moving panorama with special mechanical effects, was advertised as a "moving diorama" and an Eidophusicon. *New York American*, November 28, 1828, p.3. For more on this show, see Huhtamo (2013), p. 173 (see note 7).

14. "Washington's Birth Day," *Boston Patriot and Daily Chronicle*, February 24, 1820, p. 2.

15. "In Honor of the Visit to this City of Gen. Lafayette," *Boston Commercial Gazette,* August 23, 1824, p. 3.

16. "Entry of La Fayette into Philadelphia," *Painesville Telegraph*, October 9, 1824, p. 2.

17. *City Gazette* (Charleston), June 30, 1820, p. 3.

18. *Providence Patriot*, October 23, 1824, p. 4.

19. Hsiang-Fu Huang. 2013. Beyond celestial toys: orreries and public astronomical lectures in the eighteenth century. *Taiwanese Journal for Studies of Science, Technology and Medicine*, Number 16 (April 2013): 161-222. Hsiang-Fu Huang. 2016. When Urania meets Terpsichore: a theatrical turn for astronomy lectures in early nineteenth-century Britain. *History of Science* 54:45-70. Hsiang-Fu Huang. 2018. A shared arena: the private astronomy lecturing trade and its institutional counterpart in Britain, 1817-1865. *Notes and Records, The Royal Society* 72:319-341. Kentwood D. Wells. 2017. Russell's Planetarium: "One of the Greatest Curiosities of the Day." *The Magic Lantern Gazette* 29 (1):19-23.

20. On Walker's Eidouranion, see: Huang (2016, 2018) (see note 19); Jan Golinski. 2017. Sublime astronomy: the Eidouranion of Adam Walker and his sons. *Huntington Library Quarterly* 80:135-157; Martin Bush. 2019. The astronomical lantern slide set and the Eidouranion in Australia. *Early Popular Visual Culture* 17:9-33. Some scholars have suggested that the Eidouranion involved some type of rear projection with a magic lantern. However, Bush makes a convincing argument that Walker's original apparatus and all of its successors were based on large transparent paintings. For one thing, the sheer size of the device (starting at 10 feet high and later expanding to more than 20 feet) makes it impossible to imagine an image of that size being projected using the type of illuminants available before the 1830s. For more on the use of transparencies in astronomy lectures, see: Hsiang-Fu Huang. 2015. *Commercial and Sublime: Popular Astronomy Lectures in Nineteenth Century Britain*. Ph.D. Thesis, University College London, pp. 225-232.

21. "Dr. Birkbeck's first lecture on the general principles of mechanical science," *The London Mechanics' Register*, number 44 (Saturday, August 5, 1825), pp. 242-248. This is the same George Birkbeck who later that year, gave a lecture with perhaps the first demonstration of limelight as an illuminant for both the oxyhydrogen microscope and the magic lantern: "Dr. Birkbeck's lecture on telescopes and microscopes," *The London Mechanics' Register*, number 61 (Saturday, November 26, 1825, p. 67). Birkbeck's lectures are discussed in more detail in: Kentwood D. Wells. 2017. Fleas the size of elephants: the wonders of the oxyhydrogen microscope. *The Magic Lantern Gazette* 29 (2/3):3-34.

22. *A Catalogue of the Library of the London Institution: Systematically Classified. Preceded by an Historical and Bibliographical Account of the Establishment* (London, 1835), pp. xxv-xxvi. For more on the London Institution, see: J. N. Hays. 1974. Science in the City: the London Institution, 1819-40. *The British Journal for the History of Science* 7:146-162. According to Hays (pp. 156-157), the gas lighting system installed in the Institution's building, which used gas manufactured on the premises, did not function very well and proved to be a drain on the Institution's finances. The reference to the Phantasmagoria refers to a Phantasmagoria lantern like those made by Philip Carpenter, not a version of Robertson's Phantasmagoria show.

23. *A Catalogue of the Library of the London Institution*, pp. xxxiii -xxxvi. On Wallis's astronomy lectures, see Wells (2017), Huang (2015) (see note 20), Huang (2018) (see note 19). John Millington (1779-1868) lectured on astronomy, natural philosophy, chemistry, mechanics, and other topics to various institutions and worked with George Birkbeck to establish the London Mechanics' Institution. He later moved to the United States, where he was involved in building an apparatus to exhibit transparencies. See: Sanford Charles Gladden. 1933. John Millington (1779-1868). *The William and Mary Quarterly* 13:155-162. Jonathan Pereira (1804-1853) was a London pharmacologist and lecturer on chemistry and Materia Medica. See: Jonathan Pereira, *Wikipedia*.

Edward Wedlake Brayley (1802-1870) lectured on a wide range of scientific topics from geology and chemistry to natural history at various scientific institutions. He used transparencies to illustrate many of these lectures and carried this practice over to lectures prepared for use in schools. In 1831, while he served as Teacher of Physical Sciences at Hazelwood and Bruce Castle Schools, he published *The Utility of the Knowledge of Nature Considered; with Reference to the Introduction of Instruction in the Physical Sciences into the General Education of Youth* (Baldwin and Cradock, London), in which he described elements of the schools' science curriculum: "Besides the principal series on Chemical Science, less extended Courses of Lectures have been given, on Geology, illustrated by Mr. Greenough's Geological Map of England and Wales, by Mr. De La Beche's Tabular and Proportional View of the Superior, Supermedial, and Medial Rocks, and by drawings representing sections of strata, &c.; on the Steam-Engine . . . on Meteorites, illustrated by a small collection of those remarkable substances in the possession of the Teacher, and by **a series of transparencies** [emphasis added] representing the meteors from which they are projected; and some detached portions of the Natural History of the Invertebrate Animals, especially of the *Annulosa* (including Insects and the Crab-tribe), as well as some interesting groups of *Tunicata*, *Radiata*, and *Acrita*; **illustrated by transparencies** representing the animals, or parts of them, on a highly-magnified scale." He added that "The pictorial illustrations [transparencies] employed in the Lectures of Meteorites, were those which had been previously used by the Teacher, in the Courses delivered by him upon that subject, at the Russell Institution, in 1825, the London Institution, in 1828, the City of London Literary and Scientific Institution, in 1829, and the Birmingham Philosophical Institution, in 1830. Those with which the Lectures on the Natural History of the Invertebrate Animals were illustrated, formed part of a series employed in Courses, on the Animal Kingdom, and on the Organization of Animals, given respectively, at the London Mechanics' Institution, in 1827, and at the Russell Institution, in 1829" (p. 84). For more on Brayley as a lecturer, see: W. A. C. Stewart and W. P. McCann. 1967. *The Educational Innovators 1750-1880* (MacMillan, London), pp. 115-118.

24. Mr. Read: "Astronomical Transparencies," *Columbian Register* (New Haven), October 12, 1816, p. 3: "Mr. Whitlow's Botanical Transparencies exhibited here last winter suggested the idea of teaching astronomy upon the same principle." Mr. Dewey: *Columbian Centinel* (Boston), February 23, 1820, p. 1. John Griscom:

New-York Evening Post, Feb 14, 1821, p. 3. John Griscom (1774-1852) was a chemist and mineralogist who founded a short-lived private high school in New York. See: John Sinkankas. 1998. John Griscom in Europe 1818–1819: An early American view of mineralogy abroad. *Earth Sciences History* 17:3-21. Hartford Museum: *Connecticut Courant*, November 16, 1830, p. 3. Rev. Mr. Coffin: *Baltimore Sun*, January 18, 1843, p. 2. The distinction between "transparencies" and "magic lantern slides" generally was clear in newspaper announcements through the 1830s. For example, an advertisement for Peale's Museum in Baltimore in 1826 stated that "Transparencies will be exhibited in the Lecture Room of the Museum. A full band of Music will attend during the evening. The Magic Lantern will be shown at 8 o'clock." *Baltimore Patriot*, December 28, 1826, p. 3. By the 1840s, the terms became muddled. Early announcements for lectures by Dionysius Lardner referred to "transparencies." Only upon reading later announcements does it become clear that for some lectures, he was exhibiting glass lantern slides projected with a limelight magic lantern. It also is possible that he used a combination of painted transparent paintings and lantern slides, both of which could have been illuminated by limelight. See: Kentwood D. Wells. 2017. Dionysius Lardner: popular science showman of the 1840s. *The Magic Lantern Gazette* 29 (1):3-18.

25. "Astronomy," *Charleston Courier*, December 1, 1824, p. 2. The lecturer mentioned in this letter was Ezra A. Stevens, who advertised astronomy lectures in Charleston to begin on Thursday, November 25, 1824: "In the course of his Lecture, Mr. S. will, by a method entirely new, illustrate some of the most intricate principles of the Science in such a manner as to render them perfectly plain to those who may have paid no previous attention to Astronomy. Mr. Stevens will illustrate the cause of the Sun's Declination, and the consequent Variety of Seasons: Changes and Phases of the Moon—Solar and Lunar Eclipses—cause of the Ebbing and Flowing of the Tides, &c. &c." *Charleston Courier*, November 24, 1824, p.2. Stevens's "method entirely new" may have referred to magic lantern slides, most likely manufactured by Philip Carpenter. See: Mark Butterworth. 2007. Astronomical Lantern Slides. *The Magic Lantern Gazette* 19 (2):3-11. Just above the ad for Stevens's lectures, on the same page, there is a long announcement from Mr. [Robert] Goodacre (1777-1835), who proposed to arrive in Charleston in December to lecture on astronomy with just the sort of complex apparatus that so offended the letter writer: a Transparent Terrestrial Globe, upwards of fifty square feet of surface area; a Horizontal Tellurian, Lunarian, and Eclipsereon (?) [printing of the end of this word is damaged in original], fifty-four feet in circumference; a Vertical Transparent Tellurian, with designs of the four seasons and a double Zodiac, 30 feet in circumference; a splendid Transparent Orrery, containing the Sun, with all the Planets and Satellites; two elegant Transparent Planispheres of the visible Starry Heavens, forty-five feet in circumference; and a Plan of a Universal System, or System of Solar Systems, thirty feet in circumference. By giving measurements as the circumference of a circle, this ad makes it hard for an average person to visualize the size of the objects and perhaps was calculated to make them seem larger (a circle 54 feet in circumference has a diameter of about 17 feet). On Goodacre's lectures, see: Ian Inkster. 1978. Robert Goodacre's astronomy lectures (1823–1825), and the structure of scientific culture in Philadelphia. *Annals of Science* 35:353-363.

26. "Botanical lectures," *The Morning Chronicle* (London), April 12, 1812, p. 1. George Simonds Boulger. 1898. "Thornton, Robert John," *Dictionary of National Biography*, volume 56.

27. "National Scientific Institution," *The Morning Chronicle* (London), March 12, 1813, p. 2. Thornton's use of gas lights to illuminate his transparencies pre-dated the general use of coal gas for theater stage lighting, which began about 1817. See: Altick (1978) (see note 7), p. 185.

28. Miranda Andrea Mollendorf. 2013. *The World in a Book: Robert John Thornton's "Temple of Flora" (1797-1812).* Ph.D. dissertation, Harvard University. Mollendorf's description of Thornton's transparencies relies mainly on research by Phillip Weimerskirch, presented in a couple of lectures at conferences: Phillip Weimerskirch. 2011. "Robert John Thornton's *The Temple of Flora*, his Transparencies and their use in illustrating lectures on Botany in England and America," Conference paper delivered at the Society for the History of Authorship, Reading, and Publishing (SHARP), Washington DC, July 16, 2011 (not seen by this author). Apparently, this work has not been published in a fully sourced article. Thornton's presentation resembled the "roll transparencies" produced by the French artist Louis Carrogis, known as Carmontelle, in the 1780s, but whether Thornton knew of his work is not known. Carmontelle's transparencies showed a continuous scene, such as a stroll through a garden, whereas Thornton's showed a series of separate flower images. See: Huhtamo (2013) (see note 7), pp.39-46. Laurence Chatel de Brancion. 2003. *Carmontelle au Jardin des Illusions* (Editions Monelle Hayot, Château de Saint-Rémy-en-l'Eau).

29. Miranda Mollendorf. 2016. Allegories of alterity: Flora's children as the four continents. In: Yota Batsaki, Sarah Burke Calahan, and Anatole Tchikine, eds. *The Botany of Empire in the Long Eighteenth Century* (Dumbarton Oaks Research Library and Collection, Washington DC), pp. 283-306. Janet Browne. 1989. Botany for Gentlemen: Erasmus Darwin and "The Loves of the Plants." *Isis* 80:592-621. Fredrika J. Teute. 2000. The Loves of the Plants; or, the cross-fertilization of science and desire at the end of the eighteenth century. *Huntington Library Quarterly* 63:319-345.

30. "Botanical Lecture," *The Morning Post* (London), May 6, 1813, p. 3. The passage about Pythagoras appears with similar language in Thornton's book, and it seems likely that his lectures in general were drawn largely from his published work. Thornton's botanical plates often have been considered among the most beautiful of the era, but one recent scholar criticized the shallowness of the book's text and considered it "a complete triumph of style over substance." See: Brent Elliott. 2007. Botanical art in the Age of Linnaeus, p. 98, in *The Linnaean Legacy: Three Hundred Years After His Birth. The Linnaean Special Issue Number 8*, The Linnaean Society of London. Dr. Priestley is Joseph Priestley (1733-1804), British chemist and co-discover of oxygen and close associate of Erasmus Darwin. Sir W. Jones is Sir William Jones (1746-1794), a scholar of languages and founder of the Asiatic Society of Bengal. He arrived in India in 1783 aboard the frigate *Crocodile* and lived in Asia until his death. See: Sir William Jones (1746-1794) – Royal Asiatic Society.

31. *The Morning Chronicle*, January 14, 1815, p. 4. Very little is known about Robert's son Bonnell. The statement in the newspaper about "a name of distinguished celebrity" refers not to Robert's son, but to his father, Bonnell Thornton (1725-1768), a well known poet and essayist.

32. *Morning Post*, January 30, 1819, p. 1.

33. *Morning Chronicle*, March 5, 1819.

34. *Morning Chronicle*, April 7, 1819. "Laughing gas" was a name given to nitrous oxide by Sir Humphrey Davy, who experimented with the gas as a treatment for pain. Nitrous oxide induced giggling or laughing in some patients, and administering laughing gas to members of the audience became a popular form of entertainment in the early 19th century. See: The Wacky History of Nitrous Oxide: It's No Laughing Matter | DOCS Education. Humphrey Davy. 1800. *Researches, chemical and philosophical –chiefly concerning nitrous oxide or dephlogisticated nitrous air, and its respiration.* Printed for J. Johnson, London. Thornton had a particular interest in pneumatic medicine, the use of gases as medical treatments. This interest was shared with contemporaries such as Erasmus Darwin, Joseph Priestley, and Thomas Beddoes, all members of the Lunar Society of Birmingham, a group of scientific gentlemen who meet monthly during the full moon. The term "Uranoscope" was used by Bonnell Thornton for a type of Eidouranion. Decades later in the United States, the term was used to describe Russel's Planetarium, a very large mechanical orrery ("Russel's Uranoscope," *Scientific American*, May 8, 1847; Wells 2017 [see note 19]). A Google search mostly turns up references to a "stargazer" fish (genus *Uranoscopus*).

35. *Morning Post*, August 12, 1825.

36. Robin Wootton. 2011. The Hudson Transparencies. A set of remarkable visual aids by a distinguished Victorian microscopist. *Report and Transactions of the Devonshire Association* 143:61–90. See also: The Hudson Transparencies - Archives Hub (jisc.ac.uk).

37. E. Charles Nelson. 2013. Charles Whitlaw (ne Whitly) (1771-1850): botanist, horticulturalist, charlatan and quack. *Archives of Natural History* 40:94-110. Phillip J. Weimerskirch. 2009. Using transparencies of illustrate lectures on botany by a Scot in America in 1816 (abstract of a talk given at a symposium on *The Green Nineteenth Century* at the 30th annual conference of the Nineteenth Century Studies Association in Milwaukee, Wisconsin).

38. "Botanical Lectures and Exhibitions," *Commercial Advertiser* (New York), January 5, 1816, p. 3.

39. "Splendid Botanical Exhibition," *Commercial Advertiser*, February 19, 1816. "Botanical Lectures," *Albany Daily Advertiser*, April 23 1816; "Botanical Lectures," *Columbian* (New York), November 14, 1816, p. 3; "For the benefit of the Orphan Asylum," *Baltimore Patriot*, January 28, 1817, p. 3; "Botanical Lectures & Exhibitions," *National Daily Intelligencer* (Washington), February 6, 1817; "A Botanical Lecture & Exhibition," *Daily National Intelligencer*, February 14, 1817, p. 3; "Botanic Lectures," *Poulson's American Daily Advertiser* (Philadelphia), April 24, 1817; "A Botanical Lecture," *Columbian Centinel* (Boston), July 9, 1817.

40. Nelson (2013) (see note 37), p. 98.

41. *The Evening Post* (New York), April 26, 1834, p.2.

42. "Communication," *New-York Herald*, January 3, 1816, p. 2.

43. "Botanical Lectures," *The Columbian* (New York), November 14, 1816, p. 3.

44. "Botanical Lectures and Exhibitions," *Poulson's American Daily Advertiser* (Philadelphia), November 30, 1816, p. 3. William Staughton (1770-1829) was a Baptist clergyman who was serving as pastor of the Sansom Street Church in Philadelphia and was later President of Columbian College in Washington (now part of George Washington University). See William Staughton, *Wikipedia*. The phrase "like the models of the anatomist" refers to the common use of highly realistic wax models by lecturers on human anatomy. In some cases, these models were used in conjunction with transparencies. For example, Dr. James Bryan gave a series of lectures on anatomy in Philadelphia in 1837, "illustrated by models, paintings, and transparencies of the finest order." *The National Gazette* (Philadelphia), January 6, 1837, p. 3.

45. "Botany," *Connecticut Herald* (New Haven), March 26, 1816, p. 3.

46. "Communication," *Poulson's American Daily Advertiser*, May 3, 1817, p. 3.

47. "Lectures in Scudder's American Museum" *New-York Columbian*, October 18. 1817, p. 3. The same announcement appeared in various New York newspapers throughout October and November. Samuel Akerly (1785-1845) was a New York physician and an enthusiastic naturalist with interests in geology, botany, and zoology, especially conchology (the study of shells). He was the brother-in-law of Samuel Latham Mitchill, eminent New York physician and naturalist, to whom Charles Whitlaw sometimes lent his transparencies for use in his own lectures. See: Samuel Akerly | Shellers From the Past and Present (conchology.be). Akerly probably did the artwork for his transparencies himself. He was an accomplished artist and illustrated Mitchill's book on fishes: Samuel L. Mitchill, The Fishes of New-York, described and arranged. *Literary and Philosophical Society of New York. Transactions.* Vol. 1, no. 5 (New York, 1815). See: Urban Neighbors (nypl.org).

48. *Baltimore Patriot*, April 23, 1828, p.2. "Zollickoffer, William (1793-1853)," *American Medical Biographies* via Wikisource.

49. *The National Gazette* (Philadelphia), March 6, 1833, p. 2.

50. *The National Gazette* (Philadelphia), March 25, 1833, p. 2.

51. "Zoological Lectures," *Saturday Morning Transcript* (Boston), September 21, 1833, p. 9. "Lectures on Zoology," *Eastern Argus* (Portland, Maine), November 8, 1833, p. 3.

52. "Lectures on Zoology," *New-Bedford Mercury*, May 2, 1834, p. 2. "Lectures on Zoology," *Portsmouth Journal of Literature and Politics*, October 18, 1834, p. 3; October 25, 1834, p. 3. "Salem Lyceum. Novel Exhibition of Several hundred Transparent Pictures," *Salem Gazette*, February 13, 1835, p. 3. "Lectures on Zoology," *Baltimore Gazette and Daily Advertiser*, November 23, 1835, p. 1. *Daily National Intelligencer* (Washington), November 27, 1835, p. 3 (reports on Baltimore lecture). *The National Gazette* (Philadelphia), April 11, 1836, p. 2.

53. Franklin Spencer Edwards. 1902. *History of the Central High School of Philadelphia* (J. B. Lippincott Company, Philadelphia), pp. 47-49.

54. Gladden (1933) (see note 23). "John Millington, civil engineer and machinist No. 207 Pine street. 10 doors below Seventh Street, Philadelphia" [Advertisement] http://www.loc.gov/resource/rbpe.150220a.

55. Nicola Monachesi. *Wikipedia.*

56. Robert D. Monroe. 1959. William Birch McMurtrie: a painter partially restored. *Oregon Historical Quarterly* 60:352-374.

57. Lester D. Stephens. 2003. The Literary and Philosophical Society of South Carolina: a forum for intellectual progress in antebellum Charleston. *The South Carolina Historical Magazine* 104:154-175. "Literary and Philosophical Society," *Charleston Courier*, December 10, 1835, p. 2. "Literary and Philosophical Society," *Charleston Courier*, May 4, 1837. Dr. Benjamin B. Strobel (1805-1849) was born in Charleston and lived for a time in the Florida Keys, where he met with John James Audubon in 1829. He returned to Charleston in 1833 and established a medical practice, returning to Florida in 1836 to serve as Regimental Surgeon with the South Carolina Volunteers in the Second Seminole War. He was Professor of Anatomy at the Medical College of South Carolina and offered a private course of lectures on anatomy in 1836. See: Jerry Wilkinson, Dr. Benjamin B. Strobel IK Dr. B. B. Strobel (keyshistory.org); E. A. Hammond. 1963. Dr. Strobel's account of John J. Audubon. *The Auk* 80:462-466. James H. Smith was a Biblical Geologist who believed that the topmost geological stratum of the Earth contained deposits from Noah's Flood. See: Lester D. Stephens. 2000. *Science, Race, and Religion in the American South. John Bachman and the Charleston Circle of Naturalists, 1815-1895* (University of North Carolina Press, Chapel Hill), p. 32. Eli Geddings (1799-1878) was a local surgeon in Charleston. At the time of his lecture, he was Professor of Pathological Anatomy and Medical Jurisprudence at the Medical College of South Carolina. He was part of the circle of naturalists in Charleston and an early subscriber to the Elephant Folios of John James Audubon. His Audubon Folio was destroyed during the burning of Columbia, South Carolina in the Civil War, when he served as a surgeon with the Confederate Army. See: Geddings, Eli | South Carolina Encyclopedia (scencyclopedia.org).

58. "Lecture on the Organization and Habits of Insects," *Southern Patriot* (Charleston), June 22, 1836, p. 2.

59. "Literary and Philosophical Society," *Charleston Courier*, May 2, 1840, p. 3. "Lyceum Lectures," *Charleston Courier*, February 22, 1841, p. 2.

60. "Mr. Carroll's Lectures on the History of Charleston," *Charleston Courier*, June 12, 1844, p. 2.

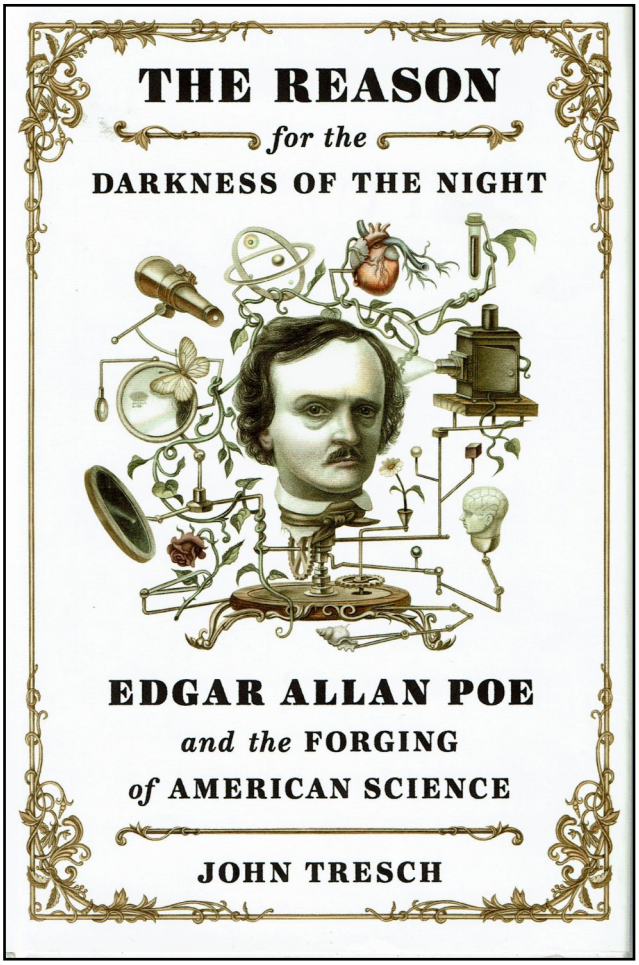
61. *Weekly Herald* (New York), November 27, 1841. *Baltimore Sun*, April 23, 1842, p.3.

62. *Charleston Courier*, December 19, 1842, p. 2.

63. *Charleston Courier*, December 21, 1842, p. 2.

64. References to "paintings" and "transparencies" in relation to magic lantern slides lingered on for several decades. In 1845, a Philadelphia newspaper advertised for sale "A MAGIC LANTERN, in complete order, and **nearly 100 splendid PAINTINGS**" (emphasis added); *Public Ledger*, May 28, 1845, p. 2. In 1851, a photographic journal published a description of the Langenheim Brothers' new type of photographic slides: "Magic Lantern Slides.—We have just seen some beautiful specimens of the Hyalotypes taken by Messrs. Langenheim, of Philadelphia. These pictures presenting **transparent impressions**, are on glass, and possess the utmost fidelity, thus making them the most desirable slides for magic lanterns;" *The Daguerreian Journal*, August 1, 1851. In 1859, Philip P. Carpenter (1819-1877), nephew of Philip Carpenter, inventor of the phantasmagoria lantern, spoke to the Albany Institute and "showed also how common stereoscopic views could be employed in the same way as paintings made for the purpose, as **transparencies for the magic lantern**. He exhibited several such views in the magic lantern with excellent effect; among others, views of Victoria Bridge in various positions and stages." This refers to the type of glass stereoscopic views produced by the Langenheim Brothers and the French photographers Ferrier and Soulier, which could be cut in half for use as magic lantern slides; *Albany Evening Journal*, November 18, 1859, p. 2. Carpenter, a Presbyterian minister, was a serious conchologist, with many publications in the field. He donated a "large and exquisite collection of shells to the [New York] State Cabinet [of Natural History]" (later the New York State Museum). He settled in Canada in the 1860s. See: W. H. Dall. 1877. "Dr. Philip Pearsall Carpenter," *American Naturalist* 11:504–505; Russell Lant Carpenter. 1880. *Memoirs of the Life and Work of Philip Pearsall Carpenter: Chiefly Derived from His Letters* (C. Kegan Paul & Company, London). An 1869 announcement about Marcy's sciopticon stated that, "Since the substitution of **photographic transparencies** for the coarse paintings formerly only used with the magic lantern, the instrument has assumed a new importance;" *San Francisco Bulletin*, December 21, 1869, p. 1. In 1870, a brief notice on the use of photography in medical education stated that "[Photographs] may be subsequently enlarged or reduced as desired, and **reproduced on glass in the form of transparencies**, then colored with transparent pigments. By means of the magic lantern, the pictures are thrown upon a screen and magnified;" *Columbian Register* (New Haven), September 17, 1870, p. 2. A meeting of a photographic society in San Francisco in 1876 featured "a grand magic lantern exhibition . . . **transparencies** being furnished by the different photographic establishments associated with the society;" *San Francisco Bulletin*, July 5, 1876, p. 3. The following year, the Photographic Art Society of the Pacific held a meeting on the "carbon process" in photography, which included a "Magic Lantern" exhibition "in which **'Transparencies'** made by that process will be exhibited;" *San Francisco Bulletin*, February 8, 1877, p. 3. From the first introduction of photographic lantern slides around 1850, photographers emphasized the transparency of the glass slides and their luminous appearance as selling points. For a brief period in the mid to late 1850s, French photographers who specialized in glass lantern slides and stereoviews also produced large "exhibition format" glass transparencies (approximately 12 x 16 inches or larger), sometimes advertised as "photographic stained glass." These were mostly exhibited at World's Fairs and photographic society meetings. The photographers Ferrier and Soulier continued producing large format glass transparencies into the early 1860s, but they were never a commercial success. See: Kim Timby. 2016. Glass transparencies: marketing photography's luminosity and precision. *PhotoResearcher* no. 25:7-24. The art of large glass transparencies was revived in the late 19th century by John K. Hillers, a U. S. government photographer, who produced large transparencies up to 30 x 40 inches of Western landscapes and American Indians, mostly exhibited at World's Fairs. See: Bruce Hooper. 1988. Windows on the nineteenth century world: John K. Hillers' glass window transparencies. *History of Photography* 12:185 -192.

65. Wells (2017) Dionysius Lardner (see note 24). Aside from the oxyhydrogen microscope, illustrated lectures on natural history and biology were scarce in the 1840s and 1850s. Wells (2017) Fleas. . . (see note 21).



John Tresch. 2021. *The Reason for the Darkness of the Night. Edgar Allan Poe and the Forging of American Science.* Farrar, Straus and Giroux, New York. ISBN:978-0-374-24875-0. 434 pp. $30.00 (hardcover).

In 1842, Edgar Allan Poe published a short tale in *The Gift*, an annual volume of collected poems and short stories, supplemented by fine illustrations and bound in highly ornamented leather, an extremely popular type of Christmas or New Year's gift in the early 19th century. Called "Eleanora: A Fable," the story describes the life of a "daydreamer," who lives with his aunt and beautiful cousin in an "encircled domain" covered with grass of multiple shades of green and flowers of various colors. When the cousins fall in love (as Poe did, when he married his cousin, age 13), the landscape changes as brightly colored new types of flowers and even scarlet flamingos appear. As the cousin, Eleanora, falls ill and eventually dies, the landscape darkens and bright colors fade away. In his fascinating new biography of Poe, John Tresch compares this "encircled domain" with changing colors to the dissolving views presented at Peale's Museum in Philadelphia, where

Poe lived at the time. One advertisement for these dissolving views described a seemingly magical transformation of a bright, colorful summer landscape to a bleak, "cheerless withering WINTER SCENE," a popular theme in exhibitions of dissolving views in the 1840s. These sorts of transformations would have unfolded as a series of circular images on a screen.

This was not the only time that Poe turned to magic lantern imagery in his writing. Tresch discusses another story, "The Island of Fay," which "conjured a luminously encircled landscape." The story, printed in *Graham's Magazine* in 1841, was accompanied by a mezzotint engraving of a wooded island in a river, strikingly similar in style to the hand-painted lantern slide shown in a previous illustration (pp. 166-168).

Indeed, the magic lantern theme appears throughout Tresch's book. The second illustration in the book is a moving astronomical lantern slide, while the last is a lantern slide showing a lighthouse and a full moon casing their lights on a dark and stormy sea. Other lantern slides showing Romantic landscapes, volcanic eruptions, and other familiar magic lantern images are scattered throughout the book. In fact, the whole biography is something of a magic lantern show itself, with scenes from Poe's life dissolving into one another as he repeatedly lurched between periods of productive writing and periods of despair, brought about by depression, alcoholism, and a constant struggle for money and food for his family (Poe was the first American writer to attempt to make a living from writing alone, mostly unsuccessfully). Poe could have been a character in a 19th century temperance magic lantern show—a successful and respected gentleman brought low by demon drink, a sick or dying child at home (in this case, his own wife), and periodic scenes of redemption as he changed jobs or even cities and explored new forms of writing. In the chapter on Poe's final decline and death, the author invokes an image of the extinguishing of a magic lantern's light at the end of a show (p. 336).

The magic lantern theme of this book is imbedded within the larger theme of Poe's engagement with the early development of American science. His short life (1809-1849) encompassed a period in which many strands of American culture were evolving in parallel: science; publishing of books, periodicals, and newspapers; public lecturing in Lyceums and Mechanics' Institutes; mass entertainments that included magic lantern shows, dioramas, panoramas, and other visual spectacles. It was an era in which the lines between "professional" scientists, amateurs, charlatans, and humbugs were blurred. Through his work as a journalist, magazine writer and editor, and even as a poet, Poe engaged with all of these developments.

From the time he received a telescope as a gift at age 16, Poe developed a life long interest in astronomy, as well as physics, natural history, and more questionable fields of "science" such as mesmerism and phrenology. He studied mathematics and engineering at the U. S. Military Academy at West Point. He wrote about science as a journalist and magazine editor, reviewed the latest scientific books from America and Europe, attended public lectures on science, and even wrote a textbook on conchology (the study of shells), which became his best-selling publication, despite his lack of expertise in the field (He received the handsome sum of $50).

As a critic and magazine editor, Poe wielded a sharp pen against those he considered to be literary pretenders, charlatans, or scientific humbugs, sometimes savaging individuals who had previously assisted him in his own endeavors. He took a particularly dim view of Dionysius Lardner, the most popular science lecturer of the 1840s, and by far the most financially successful. Poe distained Lardner's lectures on astronomy and other topics, with his trunk loads of magic lantern slides, planetariums, and other visual aids. Yet he also was influenced by Lardner and other itinerant astronomy lecturers of the era.

Tesch begins and ends his biography with a long discussion of one of Poe's strangest, yet largely unknown works, a lecture and short book called *Eureka: an Essay on the Material and Spiritual Universe*. This ambitious work was nothing less than Poe's theory of the Cosmos and the origins of the Universe. New York newspapers that announced the upcoming lecture in 1848 gave the title as simply "The Universe." According to Tesch, Poe was not modest in his expectations for *Eureka*, telling a friend it would "revolutionize the world of Physical & Metaphysical Science" (p. 8).

Poe's *Eureka* was a confusing mixture of science and metaphysical speculation, influenced by the works of the many authors he had read. It's basic idea was a model of repeated generation and destruction of new universes, starting with an initial particle of matter, first exploding into a universe of diffuse matter, then condensing into nebulae (gas clouds), galaxies, and megastars, leading ultimately to destruction, only to begin the cycle again. Tresch argues that Poe "framed his lecture as a risky technologically supported performance, akin to those assisted by magic lanterns, orreries, or dioramas"—like those of Dionysius Lardner, for example. "Like a magic lanternist, Poe spun the reader's reader's perceptions, blending images and arguments into an 'individual effect'—a vision of the universe as a whole" (p. 306).

This short review, focused as it is on magic lanterns, barely scratches the surface of what this book offers the reader. The research is meticulous, the writing clear and elegant, a narrative that projects Poe's life and work onto the background of the evolving strands of science, literature, and popular culture in early 19th century America.—**The Editor**.

Front and Back Covers: Hand-colored lantern slides of a baboon, a rhinoceros, and a zebra. These images are typical of slides that would have been shown in a lecture on natural history in the 19th century. Similar images may have been used on large painted transparencies on paper or fabric in the years before 1840. The feature article in this issue explores the origins of painted transparencies used in scientific lectures in the United States in the early 19th century, with a special focus on natural history.

Wells collection.